

3 9999 06317 804 8

214

POPULATION TRENDS OF BLACKBIRDS AND STARLINGS IN NORTH AMERICA, 1966-76

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Special Scientific Report—Wildlife No. 214

Library of Congress Cataloging in Publication Data

Dolbeer, Richard A.

Population trends of blackbirds and starlings in North America, 1966-76.

(Special scientific report—wildlife; no. 214)

Supt. of Docs. no.: I 49.15/3:214

1. Blackbirds. 2. Starlings. 3. Bird populations—North America. 4. Birds—North America. I. Stehn, Robert A., joint author. II. Title. III. Series: United States. Fish and Wildlife Service. Special scientific report—wildlife; no. 214.

SK361.A256 no. 214 [QL696.P2475] 639'.97'90973s [598.8'81] 78-23689

POPULATION TRENDS OF BLACKBIRDS AND STARLINGS IN NORTH AMERICA, 1966-76

By Richard A. Dolbeer
Robert A. Stehn



**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Special Scientific Report—Wildlife No. 214
Washington, D.C. • 1979**

Population Trends of Blackbirds and Starlings in North America, 1966-76

by

Richard A. Dolbeer and Robert A. Stehn

U.S. Fish and Wildlife Service
Denver Wildlife Research Center
Ohio Field Station, Sandusky, Ohio 44870

Abstract

We used the North American Breeding Bird Survey to estimate population trends of red-winged blackbirds (*Agelaius phoeniceus*), common grackles (*Quiscalus quiscula*), brown-headed cowbirds (*Molothrus ater*), and starlings (*Sturnus vulgaris*) for 1966-76 in the United States and Canada. Extended to a continental scale, the survey indicated significant increases in the mean number of redwings, cowbirds, and starlings observed per route. Starlings had the greatest increase, 4.96 birds per route or a 19.4% increase. The starling's greatest regional increases occurred in the western United States. Populations of redwings increased most in the St. Lawrence Valley and parts of the Midwest and Lower Plains regions. Cowbirds increased the most in the plains from Iowa to Saskatchewan and decreased over parts of the eastern and midwestern United States. Grackle populations indicated no change on a continental scale but did show strong increases in the Midwest and Lower Plains regions and declines in Appalachia. This knowledge of blackbird and starling population trends in specific areas should improve our ability to understand increasing bird-man conflicts, to evaluate proposed bird-damage control strategies, and to develop more effective, long-term solutions than are available at present.

Red-winged blackbirds, common grackles, and brown-headed cowbirds, hereafter in this report referred to as redwings, grackles, and cowbirds, have long conflicted with man's activities, particularly agriculture, in North America (McAtee 1926; Meanley 1971). The starling, introduced into North America in 1890, has also become a major avian pest in many areas, often joining with blackbirds in large fall and winter roosts (Davis 1950; Kessel 1953; Meanley 1965). These four species, with a combined overwintering population of at least 0.5 billion birds (Meanley and Webb 1965; Meanley and Royall 1976), undoubtedly constitute the most common group of birds in North America.

Conflicts between blackbirds and starlings and people have become more frequent in recent years, resulting in new research and management efforts to define and alleviate the various agricultural, nuisance, and health problems these birds create (Graham 1978). An important component of these research and management efforts is an objective appraisal of the trends and current status of blackbird and starling populations in North America. We need to know if the increased conflicts in a given area are the result of increased bird population levels or if they are caused by

land-use changes, human encroachment, or just greater public awareness. Also, by examining population trends, we may be able to anticipate new conflict areas before problems become severe. The lack of such information has been a major obstacle to the advancement of bird-damage control research and management in the past.

A few studies have provided estimates of population changes of territorial male redwings over a several-year period for small geographical areas (Dyer 1971; Dyer et al. 1973; Lefebvre et al. 1976). However, until the advent of the annual North American Breeding Bird Survey in 1966 (Robbins and Van Velzen 1967), a means of estimating breeding population trends of blackbirds and starlings on a wide scale was not available. In 1966, 585 Breeding Bird Survey routes were run in the eastern United States and Canadian Provinces. The survey was expanded to all contiguous 48 States and Canadian Provinces by 1968.

Our objective was to use the Breeding Bird Survey data to estimate the population trends of redwings, grackles, cowbirds, and starlings for 1966-76 in Canada and the United States. Erskine (1978) has summarized population trends for about 60 bird species for 1966-75 in Canada. Our report expands his

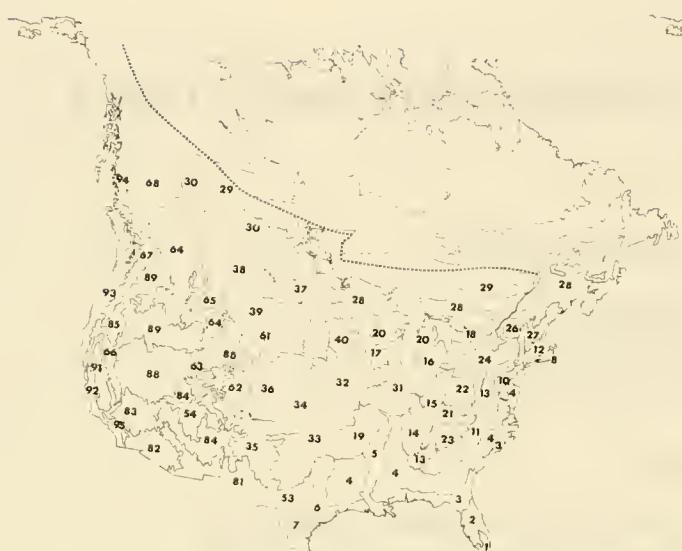


Fig. 1. Location of 62 ecological strata used in the analysis of Breeding Bird Survey data. Dashed line indicates northern limit of coverage by the Survey. (See Fig. A-1, page 32, for substrata locations.)

work on blackbirds and starlings by presenting a more detailed and complete analysis for the continent north of Mexico.

Our report is intended to serve as a reference source for a variety of people and agencies interested in blackbird and starling populations. The results are presented in various tabular and graphic displays, based on both political and ecological boundaries, so that readers, whether they are interested in a specific section of a single State or Province, a region of North America, or the entire continent, will be able to extract the information they need.

Methods

About 1,700 Breeding Bird Survey routes currently are run annually in Canada and the United States. Each count is made along a 24.5-mile (39.2-km) automobile route established at random within 1° blocks of latitude and longitude. The observer records the number and species of all birds seen or heard in 3 min at each of 50 stops made at 0.5-mile (0.8-km) intervals. Considerable effort has gone into standardizing conditions under which surveys are conducted to reduce variability. Detailed discussions of the survey methodology are presented by Robbins and Van Velzen (1969), Weber and Theberge (1977), and Erskine (1978).

The Breeding Bird Survey data for redwings, grackles, cowbirds, and starlings for 1966-76 were provided by the Migratory Bird and Habitat Research Laboratory, Laurel, Maryland. For each route we used only the data from years that the route was completed under regular conditions (i.e., status code = 1). The



Fig. 2. Location of nine regions used in the analysis of Breeding Bird Survey data. Dashed line indicates northern limit of coverage by the Survey.

number of years a route was run ranged from 1-11. In all, 2,275 routes were run for a total of 14,008 counts in the 11-year period.

Robbins and Van Velzen (1969) divided the continent north of Mexico into 56 ecological strata. These have subsequently been modified, and we used 62 strata in our analysis (Fig. 1). We then combined the strata into nine regions (Fig. 2). We used the portion of a stratum found within one State or Province, hereafter referred to as a substratum, as our basic geographical unit for analysis, i.e., a stratum extending across several States would be divided into substrata by State boundaries. There were 239 substrata in all. Analyses of populations on a State, stratum, regional, or continental basis were obtained by pooling weighted substratum statistics. The weighting factor was the fraction of the land area of interest (e.g., stratum) that the smaller geographical unit (e.g., substratum) encompassed.

We conducted the following analyses for each species using the total number of birds of a species recorded on a route in a year as the response variable. In all statistical tests, the criterion for significance was $P \leq 0.05$.

Between-year Changes in Population Indices

A major problem in analyzing population changes was that some routes were not run in consecutive years. Thus, simple mean values for all routes run in a substratum often could not be meaningfully compared between years because of discontinuity of the data. In agreement with Erskine (1978), we believed that the

best procedure was to base population change for any 2-year period only on those routes run in both years and to examine longer term trends by cumulating these between-year changes.

To test the null hypothesis of no change in mean birds per route between years for all routes run in both years in each substratum, a paired-difference *t*-test was made for each consecutive pair of years: 1966-67, 1967-68, . . . , 1975-76. In addition, we made a paired-difference *t*-test using mean birds per route per year (1974-76) minus mean birds per route per year (1966-68) to test the hypothesis of no population change between the first 3 and last 3 years of the 11-year period. Only those routes run at least once in the first 3 years and at least once in the last 3 years were used in this test.

The weighted mean difference in birds per route between 2 years for a State or stratum was estimated by multiplying the mean difference in birds per route for each substratum within the State or stratum by the weighting factor and summing the products. The weighted variance for the State or stratum was estimated by multiplying the variance of the mean difference in the birds per route for each substratum by the square of the weighting factor and summing the products. The regional and continental analyses were likewise accomplished by combining weighted strata values or weighted regional values, respectively.

Population Indices for 1966-76

We used the mid-year, 1971, as the arbitrary baseline year, assigning it a population index of 100. The indices for years before or after 1971 were calculated by cumulating the percentage changes for each pair of years. Thus, for all routes run in a substratum in both 1971 and 1972, if the mean birds per route for 1972 were 20% greater than in 1971, the index for 1972 would be 120. If the mean birds per route for 1973 were then 5% less than the mean birds per route for the same routes run in 1972, the index for 1973 would be 114. We similarly calculated the population indices for States, strata, and regions using the percentage change in weighted mean birds per route as described in the above section.

Population Trends for 1966-76

To determine if the overall population change from 1966 to 1976 for a substratum had a significant linear trend, we developed a regression model to test the null hypothesis that the annual rate of change in mean birds per route (slope) of the combined routes of the substratum was not significantly different from zero. We allowed all routes in a substratum to have separate

intercepts but only a common slope. The slope and variance of the slope for strata and States were calculated by multiplying the slope and variance of each substratum within the State or stratum by the appropriate weighting factors and squares of the weighting factors, respectively, and summing the products. The computation of regional and continental slopes and variances was similarly accomplished by summing weighted strata and regional values, respectively.

Cautions in Interpretation of Results

A survey as extensive and ambitious as this obviously is not without its faults and limitations, and care must be exercised in interpreting the results. One major concern involves the restriction of the survey to habitats within $\frac{1}{4}$ mile (0.4 km) of roadsides. Another involves the possibility that for certain species, such as the redwing, the survey mainly samples only a segment of the population (e.g., territorial males) whose numerical fluctuations might not be representative of the total population. We make a basic, but untested, assumption that changes in numbers of redwings, grackles, cowbirds, and starlings recorded by the survey bear some positive relation to changes in population levels of these species for the total substratum area.

Furthermore, some caution is suggested in comparing numbers of birds per route among areas for a species. The conspicuousness of a species may vary between areas owing to habitat differences, differences in chronology of nesting at time of the survey, or other behavioral or environmental factors. We cannot adjust for these possible sources of variation at present. However, we believe them unimportant in our analyses because we are primarily concerned with population trends and not comparisons of density indices among areas.

Appendix 1 provides an example of the calculations made in conducting the various analyses and elaborates on some of the assumptions made in analyzing the data.

Results

Geographic Distribution of Populations in Breeding Season

The mean numbers of birds per route for redwings, grackles, cowbirds, and starlings, 1966-76, are depicted in Figs. 3-6. If we assume that the number of birds per route is a valid index of density for each species during the breeding season, redwings, grackles, and starlings reached their highest densities in the mid-Atlantic and midwestern United States and

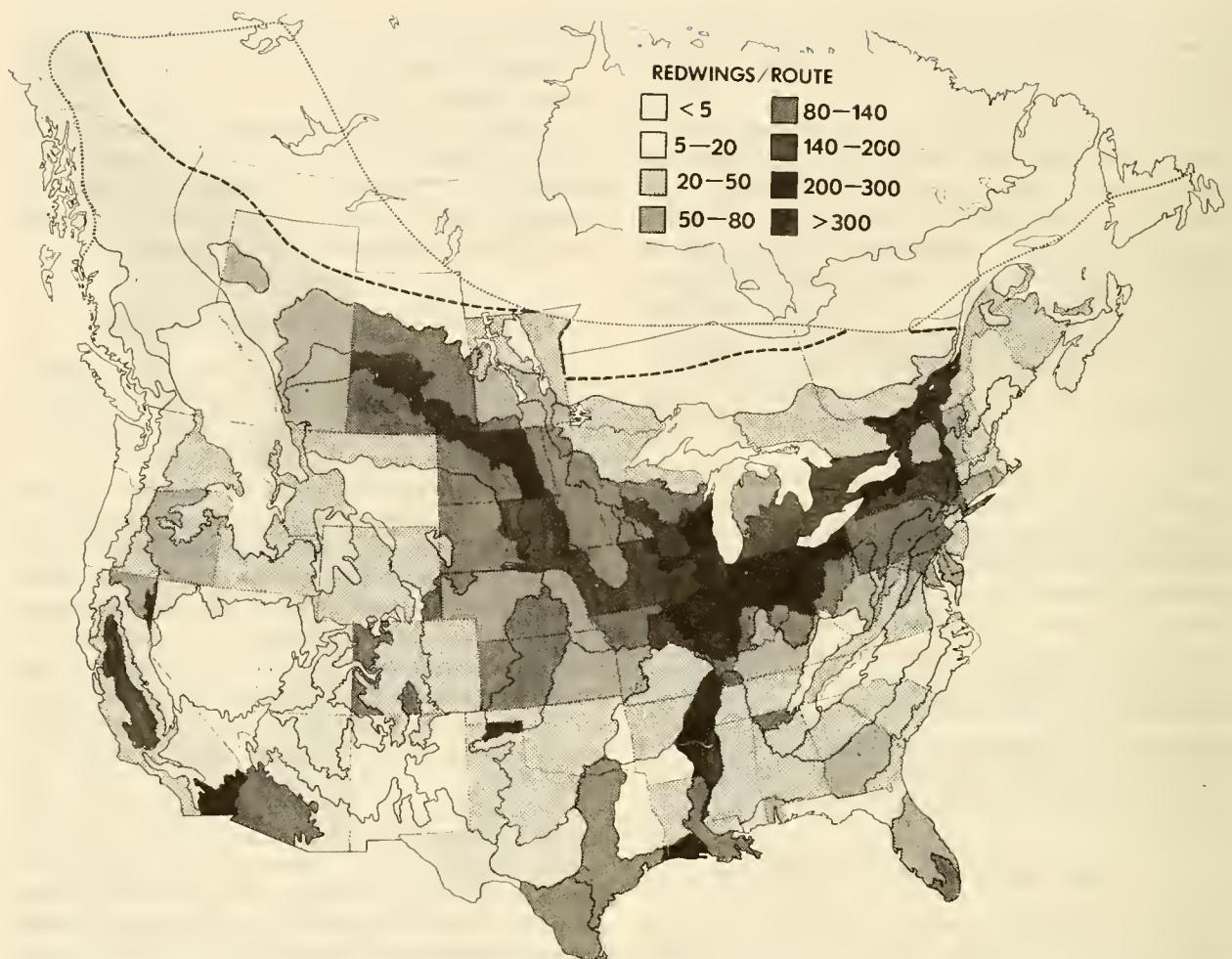


Fig. 3. Breeding season distribution for red-winged blackbirds, 1966-76. Heavy dashed line indicates northern limit of coverage of Survey; light dashed line represents approximate northern limit of breeding range (Godfrey 1966).

cowbirds in the Central Plains from Kansas to Saskatchewan. On a State or Province level, redwings were most dense in Ohio, Illinois, and Indiana; grackles in Delaware, Maryland, and New Jersey; starlings in New Jersey, Rhode Island, and Ohio; and cowbirds in North Dakota, Kansas, and South Dakota (Table 1). Ohio, Indiana, and Illinois were each among the 10 highest States in number of birds per route for redwings, grackles, and starlings. Appendix 2 lists for each species the mean number of birds per route, 1966-76, for all States and Provinces and for their respective substrata. The 10 substrata showing the greatest mean birds per route for each species are listed in Table 2.

Figures 3-6 indicate that the Breeding Bird Survey does not sample parts of the northern limits of the range of redwings, grackles, cowbirds, and starlings in boreal Canada. Populations of these four species are generally sparse and widely scattered in these range

extremities (Erskine 1971, 1977), so these areas are of little significance in our analysis of continental population changes. However, this limitation should be kept in mind in the analysis of populations in the Boreal Forest region.

Population Trends

Continent

On a continental scale, the survey indicated significant positive annual rates of change among redwings, cowbirds, and starlings. Cowbirds and starlings also indicated significant increases in the mean number of birds per route in 1974-76 compared with the same routes run in 1966-68 (Table 3). Starlings showed the greatest absolute and percentage increase (4.96 birds per route, 19.4%), whereas redwings had the greatest

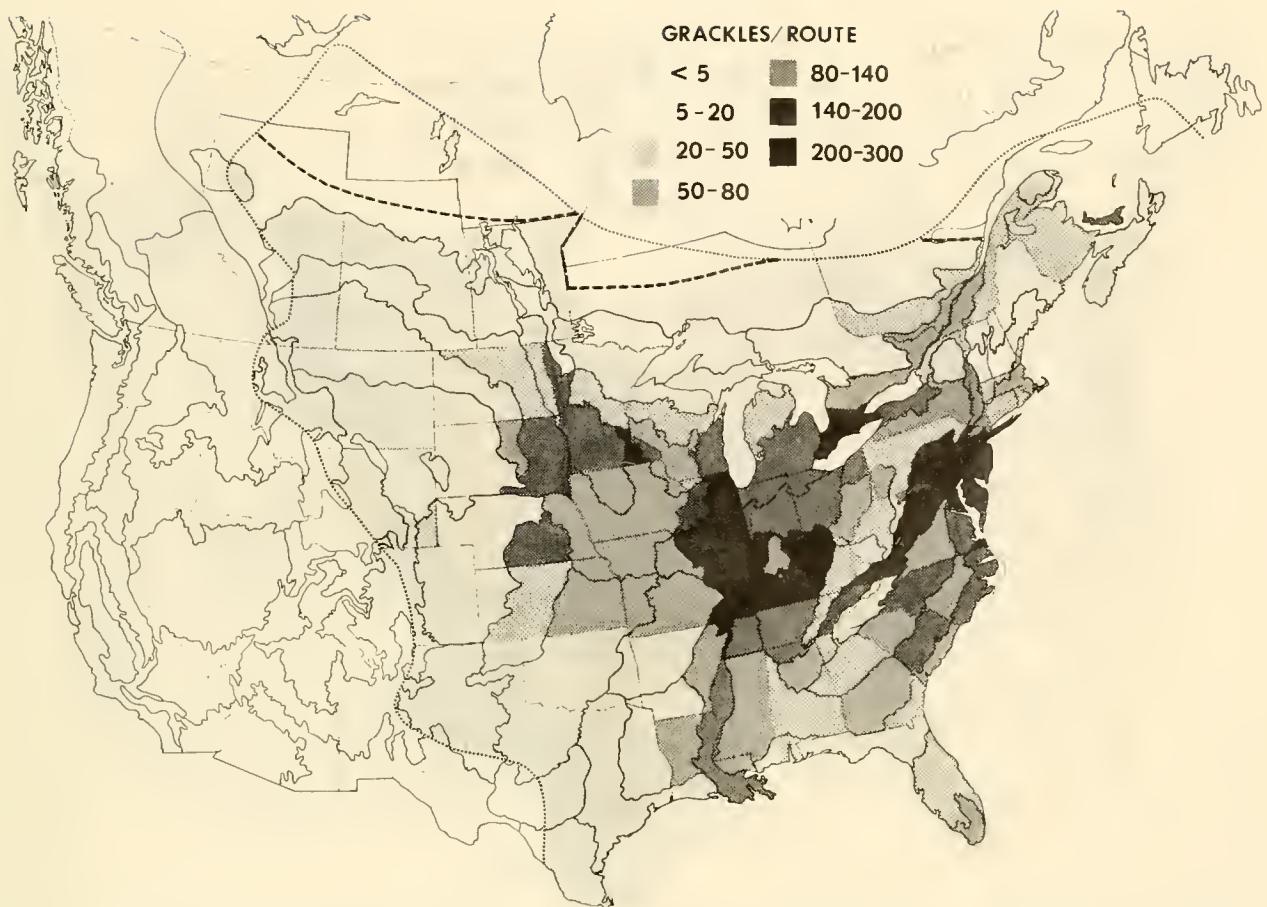


Fig. 4. Breeding season distribution for common grackles, 1966-76. Heavy dashed line indicates northern limit of coverage of Survey; light dashed line represents approximate northern limit of breeding range (Godfrey 1966).

Table 1. States ranking highest in mean number of birds per Breeding Bird Survey route, 1966-76, for red-winged blackbirds, common grackles, brown-headed cowbirds, and starlings. The values for all States and Provinces can be found in Appendix 2.

Rank	Redwings		Grackles		Cowbirds		Starlings	
	Rank	State	Mean birds/route	State	Mean birds/route	State (Province)	Mean birds/route	State
1	Ohio	250.9	Delaware	166.6	N. Dakota	45.1	New Jersey	161.8
2	Illinois	198.1	Maryland	145.3	Kansas	38.9	Rhode Island	159.2
3	Indiana	178.6	New Jersey	144.6	South Dakota	36.0	Ohio	146.8
4	Iowa	161.3	Kentucky	139.2	Nebraska	27.3	New York	121.3
5	Wisconsin	159.4	Illinois	138.9	Oklahoma	27.2	Delaware	117.6
6	North Dakota	150.7	Virginia	120.2	Missouri	22.2	Indiana	115.9
7	New York	141.6	Indiana	106.9	Wisconsin	20.9	Maryland	115.3
8	South Dakota	130.7	Ohio	106.2	Iowa	20.3	Illinois	102.6
9	Louisiana	96.8	Pennsylvania	99.0	Texas	18.8	Michigan	98.6
10	Pennsylvania	95.4	Tennessee	93.0	Saskatchewan	17.3	Massachusetts	97.5

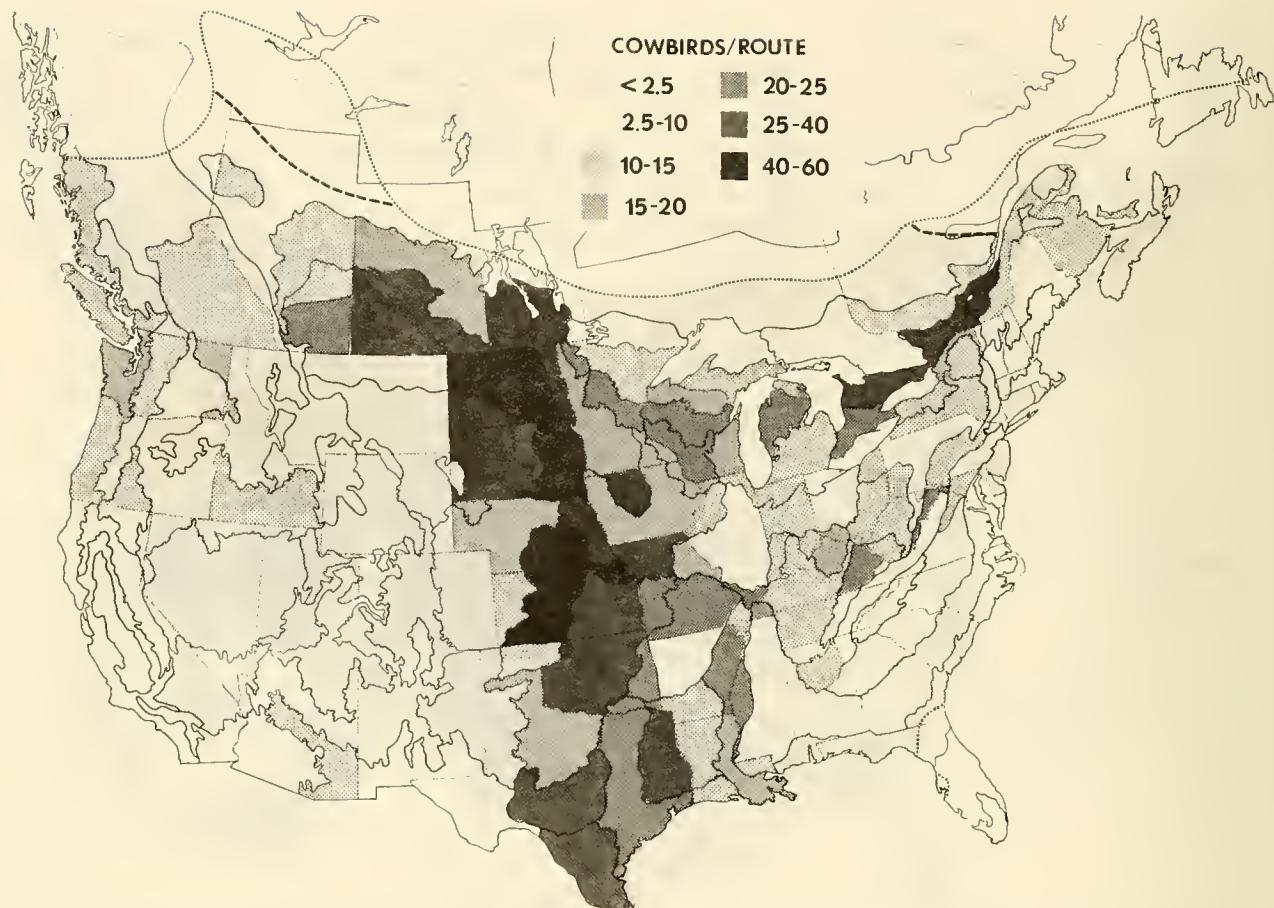


Fig. 5. Breeding season distribution for brown-headed cowbirds, 1966-76. Heavy dashed line indicates northern limit of coverage of Survey; light dashed line represents approximate northern limit of breeding range (Godfrey 1966).

rate of change (0.84 bird per route per year). Grackles indicated no significant change, although both the yearly rate of change and absolute change (1974-76 minus 1966-68) were positive. Overall, redwings were by far the species most often recorded (weighted mean birds per route = 50.4), followed by starlings (30.4), grackles (24.2), and cowbirds (10.5).

Regions

Based on the mean number of birds on routes run in 1966-68 and 1974-76, redwings showed significant increases in the Northeast, Boreal Forest, Midwest, and Lower Plains regions (Table 3). The annual rate of change indicated significant increases in these same four regions as well as in the Southeast, Upper Plains, and Northwest regions. The only significant decrease occurred in the Appalachia Region. Overall, the Northeast, Midwest, and Lower Plains regions, which are connected through the eastern Great Lakes and Mis-

sissippi River Valley, showed the greatest significant increases for redwings.

For grackles, the paired route data for 1966-68 and 1974-76 indicated significant increases in the Boreal Forest, Midwest, Lower Plains, and Upper Plains. A significant annual rate of change was positive in the Southeast, Midwest, and Lower Plains (Table 3). Significant declines were recorded in the adjacent Northeast and Appalachia regions. Thus, with the exception of the Northeast-Appalachia region, grackles appear to have increased significantly throughout most of their range in the past 11 years, especially in the Midwest and Lower Plains regions.

Cowbirds had significant increases in the Lower Plains and Upper Plains regions based on the paired-route data for 1966-68 and 1974-76 (Table 3) and in the Southeast, Boreal Forest, Upper Plains, and Northwest based on the annual rate of change data. The Appalachia and Midwest regions indicated significant decreases.

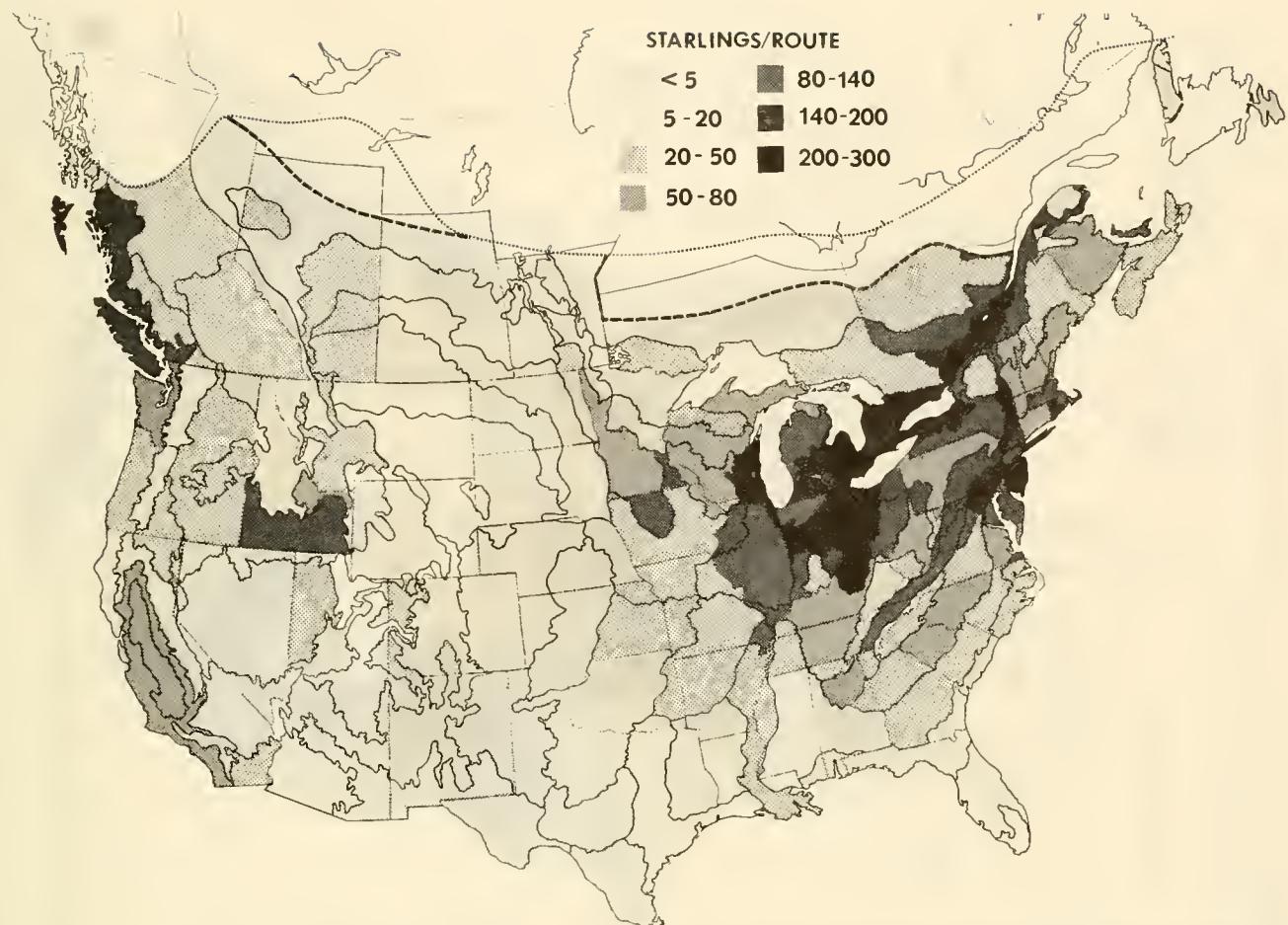


Fig. 6. Breeding season distribution for starlings, 1966-76. Heavy dashed line indicates northern limit of coverage of Survey; light dashed line represents approximate northern limit of breeding range (Godfrey 1966).

Table 2. Substrata in the United States and Canada ranking highest in mean number of birds per Breeding Bird Survey route, 1966-76, for red-winged blackbirds, common grackles, brown-headed cowbirds and starlings. A substratum had to contain a minimum of four routes to be included. The values for all substrata can be found in Appendix 2.

Rank	Redwings		Grackles		Cowbirds		Starlings	
	Substratum	Mean birds/route	Substratum	Mean birds/route	Substratum	Mean birds/route	Substratum	Mean birds/route
1	SW California	(82) ^a	NE Illinois	(16)	NE Kansas	(32)	S Ontario	(16)
2	W Ohio	(31)	SE Pennsylvania	(10)	E S. Dakota	(37)	NW New York	(16)
3	SE Wisconsin	(16)	N Kentucky	(15)	C N. Dakota	(37)	SE Pennsylvania	(10)
4	E Arkansas	(5)	S Ontario	(16)	C Kansas	(34)	NE Illinois	(16)
5	NE Ohio	(24)	W Virginia	(13)	C Nebraska	(34)	S New Jersey	(4)
6	NW New York	(16)	Delaware	(4)	E Kansas	(33)	NW Ohio	(16)
7	C Indiana	(31)	W Kentucky	(14)	SW N. Dakota	(39)	Long Is., N.Y.	(8)
8	C N. Dakota	(37)	C Maryland	(10)	E Nebraska	(32)	W Ohio	(31)
9	N Indiana	(16)	SE Indiana	(15)	E N. Dakota	(40)	C Maryland	(10)
10	C Illinois	(31)	E W. Virginia	(13)	C Saskatchewan	(37)	SE Ontario	(18)

^aStratum numbers in parentheses; see Fig. 1.

Table 3. Population trends of red-winged blackbirds (RW), common grackles (GR), brown-headed cowbirds (CB), and starlings (ST), 1966-76, for nine regions of North America.

Region	Sp.	No. routes	Mean birds/route	Annual population index												Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	Slope	P ^a	% change	abs change
Southeast wt=0.09 ^b a=406.4	RW	226	52.9	100*	82	100	91	96	100	106*	121*	107*	118#	111	2,019	1.24	*	226	12.4
	GR		64.5	92	96	104*	88*	101	100	104	121	116*	95	104		1.25	*	9.2	5.9
	CB		8.2	98	135	110	85#	105	100	123	122	140	143	143		0.32	*	23.1	5.7
	ST		26.8	117	108*	93	94*	118*	100	106	98	105*	87	85		-0.10		9.8	1.8
Appalachia wt=0.05 a=198.5	RW	258	87.3	93	99	108	106	107	100	98	98	99	92	92	1,658	-1.68	*	161	-11.9
	GR		68.9	92	79	89	89	110	100	98	92	86	85*	74		-4.57	*	-17.7	-14.3
	CB		10.5	71	76	67#	92	94	100	91	80#	68	66		-0.33	*	-13.5	-1.4	
	ST		79.3	123	89	94	92	99	100	102	103	115#	98	94		-1.58	*	-7.7	-6.8
Northeast wt=0.02 a=99.6	RW	201	98.5	68*	89	91*	108	104	100*	128	112	112*	135	136	1,211	5.29	*	120	42.2
	GR		66.7	97	90	97	96	100	95	92	84	87	84		-1.97	*	-21.6	-15.0	
	CB		15.1	68	80	74#	95	102	100	104*	86#	103	106	108		-0.18		11.4	1.7
	ST		116.1	163*	122#	98	105	108	100	95	100	107	106	119		-0.72		-2.5	-3.0
Boreal Forest wt=0.30 a=1375.5	RW	315	15.9	92	76	80	89	96	100*	114#	128	136#	149	146	1,276	1.28	*	105	33.9
	GR		4.6	61	75	90	101	94	100	108	109*	83	88	96		0.03		55.8	3.8
	CB		5.2	54	66	89	85	80*	100	84*	105*	167	154	165		-0.20	*	18.4	2.4
	ST		18.8	62	53	85	112	96	100	101	108*	62	52*	71		-0.81		6.3	1.0
Midwest wt=0.06 a=276.6	RW	280	165.7	63	78	79	82#	95	100	101	106	111	102	105	1,877	3.56	*	192	13.5
	GR		112.2	66	72*	86	90	92#	100	103#	120#	98	95	91		1.69	*	12.6	11.4
	CB		14.9	109	96	90	96	106	100*	116	112	102	104	96		-0.17	*	-4.5	-0.7
	ST		108.4	98	101	100	110	100	100	110	110	112	107#	121		1.79	*	15.3	15.1
Lower Plains wt=0.09 a=425.0	RW	209	57.1	-	93	106	117	107	100	93*	112	117	120	118	1,238	1.19	*	122	40.2
	GR		20.5	-	56	74	85	100	100	114	93	87	95	92		0.73	*	54.1	7.9
	CB		23.3	-	93	92	101	104	100	104	102	104	96	99		0.22	*	12.2	2.7
	ST		11.2	-	61	71	100	97	100	117	79	105	94	102		0.15	*	58.8	5.0
Upper Plains wt=0.13 a=600.2	RW	224	94.3	121	117	107	110	109#	100*	122	112	113	120#	113	1,206	1.28	*	128	-6.3
	GR		32.6	104	93	99	114	99	100	114	108	120	113	123		0.36		14.4	4.0
	CB		22.3	49	105#	84	94	101	100	105#	124	126	138	144		0.99	*	35.5	7.0
	ST		20.3	49	84	86*	123	108	100	102#	134	117	97#	126		1.10	*	36.2	5.9
Southwest wt=0.11 a=506.0	RW	211	40.7	-	195	195*	139*	99	100	119	133	164#	134	123	822	-2.45		53	-53.8
	GR		0.1	-	-	-	-	-	-	-	-	-	-	-		-		-	0.5
	CB		3.6	-	258	227	163	99	100	82	95	118	117	106		-0.04		-1.9	-0.1
	ST		13.8	-	0	70*	141	100	100*	148	167	184	162	143		0.88		112.2	11.0
Northwest wt=0.15 a=653.6	RW	253	19.7	-	-	74	92*	76*	100*	68	76	79	76	68	853	0.67	*	50	7.5
	GR		0.7	-	-	-	-	-	-	-	-	-	-	-		-		-	0.2
	CB		6.7	-	-	61	85	87*	100	77	72	79	73#	92		0.31	*	28.2	1.1
	ST		30.3	-	-	37*	69	88	100	134#	223	214*	313*	236		0.22	*	63.5	10.1
Weighted total for North America	RW	2,177	50.4	24.2	50.4	24.2	10.5	10.5							12,160	0.84	*	1,157	-0.64
	GR		0.25	*	0.25	*	0.50	0.50							0.07		10.4	2.22	
	CB		0.4	*	0.4	0.4	0.4	0.4							0.19	*	17.5	1.69	
	ST		30.4	30.4													19.4	4.96	

^aProbability level $P \leq 0.01 = *; P \leq 0.05 = #$

^bFraction of total land area of the nine regions.

^cLand area ($\text{km}^2 \times 1,000$).

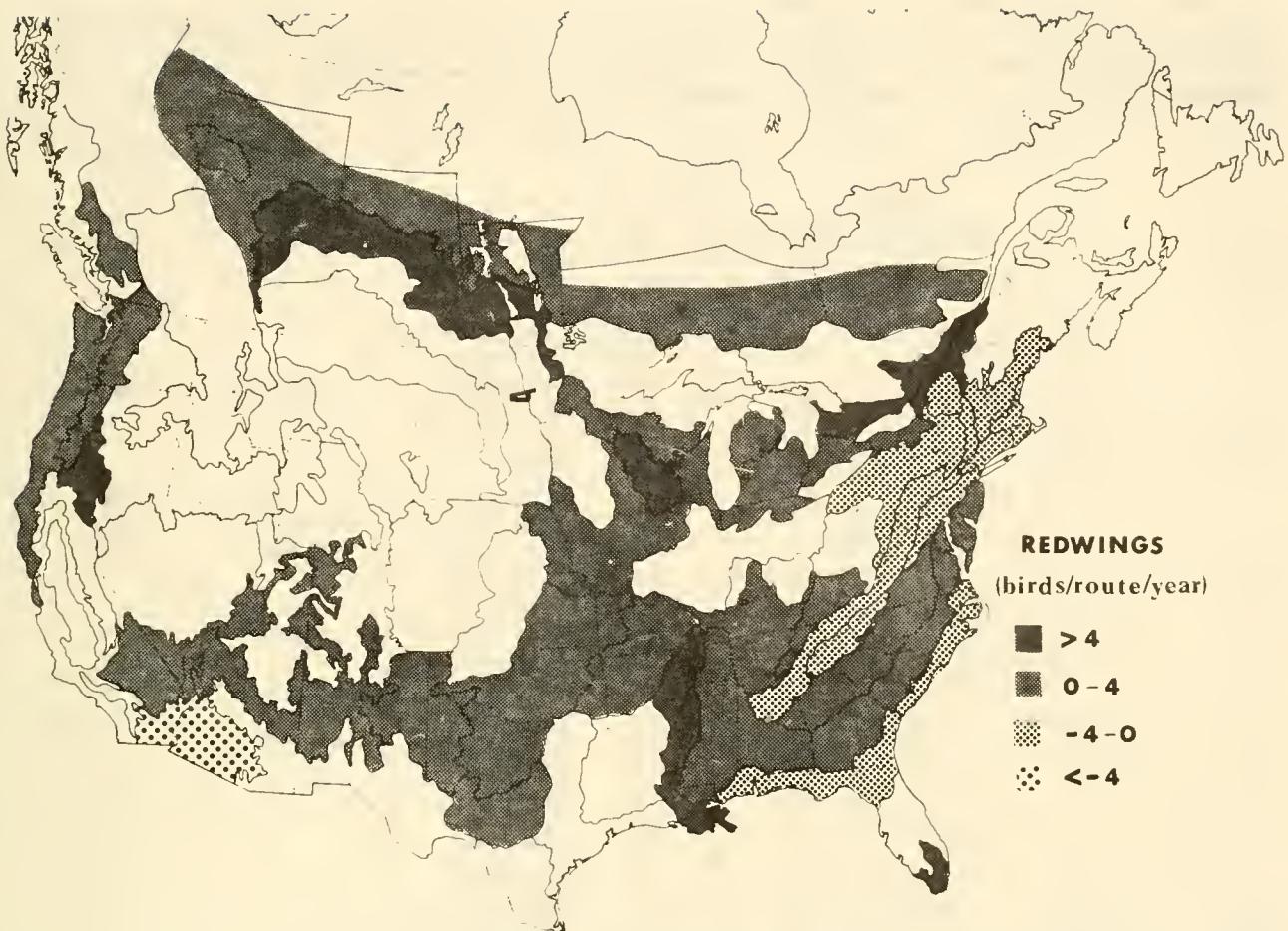


Fig. 7. Strata indicating a significant ($P \leq 0.05$) annual rate of change for red-winged blackbirds, 1966-76, based on data from Table 4.

The paired-route data for 1966-68 and 1974-76 indicated that significant increases for starlings have occurred in the Lower Plains, Upper Plains, and especially Southwest regions (Table 3). The number of starlings per route had more than doubled from 1968 to 1974-76 in the Southwest region. The annual rate of change was significantly positive in the Midwest, Upper Plains, and Northwest and significantly negative in the Appalachia region.

The Appalachia region was the only region in which both the paired comparison values for 1966-68:1974-76 and the annual rates of change values were negative for all four species. In fact, the Appalachia Region had 8 of the 21 negative signs for these measures of population trends in the nine regions during 1966-76. Conversely, the Lower Plains region had all positive signs for these measures of population trends for all four species, and the paired-comparison data indicated significant increases for all four species.

Strata

Analysis at the stratum level provides a more detailed view of population trends than at the regional level, indicating key areas of change within the regions. Table 4 lists for redwings, grackles, cowbirds, and starlings those strata within each region with significant annual rates of change in number of birds per route for 1966-76 and significant differences in mean number of birds per route for routes run in both 1966-68 and 1974-76. This same information is presented graphically in Figs. 7 and 8 for redwings, Figs. 9 and 10 for grackles, Figs. 11 and 12 for cowbirds, and Figs. 13 and 14 for starlings. Table 5 presents the number of strata having significant population changes, 1966-76 for each species.

Redwings exhibited by far their greatest increase in Stratum 18 (St. Lawrence Valley and southeastern Ontario) where the annual rate of change (1966-76) of 15.8

Table 4. *Strata indicating significant ($P \leq 0.05$) annual rate of change (slope) in number of birds per Breeding Bird Survey route (1966-76) or a significant difference in mean number of birds per route for routes run at least once in 1966-68 and 1974-76 for red-winged blackbirds (RW), common grackles (GR), brown-headed cowbirds (CB), and starlings (ST). Slopes with less than 20 df and paired-route comparisons with less than five routes are excluded.*

Region	Stratum	Species	Mean birds/ route	Slope (1966-76)	Paired route comparison 1974-76 minus 1966-68	
					Difference	Percent change
Southeast	1	RW	122.6	5.68 (27)a#b		
		GR	53.5	3.91 (27)*		
	2	ST	10.6	0.87 (115)*		
		RW	19.0	-1.93 (330)#		
	3	CB	2.7	0.28 (330)*	1.9 (37)c*	146.2
		RW	36.2	1.06 (1191)*		
	4	CB	9.3	0.37 (1191)*		
		RW	186.5	5.60 (154)*		
	11	RW	24.7	1.69 (202)*	15.3 (25)*	96.8
		GR	62.0	4.24 (202)#	24.4 (25)#	51.2
		CB	5.1	0.23 (202)*	1.7 (25)#	43.6
Appalachia	13	RW	56.5	-1.75 (573)*		
		GR	118.1	-12.83 (573)*		
		CB	9.6	-0.40 (573)*	-2.4 (59)#	-23.5
		ST	97.0	-5.07 (573)*		
	21	RW	9.4	0.73 (106)*	4.3 (9)#	51.2
		GR	25.2	1.47 (106)#		
		CB	15.5		4.6 (9)#	55.4
	22	ST	27.5	2.32 (106)*		
		GR	54.2	2.09 (257)#		
		CB	11.9	-0.42 (257)#		
Northeast	23	GR	37.8	-13.49 (46)*		
		CB	4.1	-0.63 (46)*		
	24	RW	134.6	-3.15 (676)*		
		CB	10.4	-0.29 (676)#		
	8	CB	6.5	-0.89 (41)*		
		ST	142.5	7.40 (41)#		
	10	GR	207.6	-10.50 (289)*	-91.1 (28)#+	-37.8
		CB	7.6	-0.40 (289)*	-4.5 (28)#+	-45.5
	12	RW	51.3	-1.34 (258)#+	-14.3 (26)*	-28.4
		GR	45.8	-2.00 (258)*	-11.4 (26)#+	
	18	CB	6.1	-0.39 (258)*	-3.4 (26)*	-42.5
		RW	171.9	15.81 (225)*	98.4 (24)*	92.8
Boreal Forest	26	CB	26.8	0.90 (225)*		
		RW	51.3	-3.14 (103)#+		
	27	ST	39.9	-1.83 (103)#+		
		RW	37.2	-1.03 (295)*		
	29	ST	65.2	-1.65 (295)#+		
		RW	6.5	1.38 (106)*		
		CB	3.1	0.41 (106)#+		
	30	ST	13.8	-1.10 (106)#+		
		RW	82.4	5.93 (178)*	18.5 (10)*	39.4
		GR	4.2		4.1 (10)*	170.8
Midwest	14	CB	17.2		6.7 (10)#+	23.3
		RW	58.5	3.72 (381)*	19.6 (37)#+	45.9
	15	ST	62.5	2.55 (381)*	15.2 (37)*	33.8
		CB	14.6		-5.4 (16)#+	-29.2
	16	RW	205.4	3.59 (511)*	31.0 (55)#+	17.4
		GR	134.4		23.0 (55)*	22.1
	17	ST	174.2	3.53 (511)*		
		RW	207.9	9.40 (180)*	55.9 (22)#+	31.9
		CB	21.5	-0.66 (180)#+		

Table 4. (continued)

Region	Stratum	Species	Mean birds/ route	Slope (1966-76)	Paired route comparison 1974-76 minus 1966-68	
					Difference	Percent change
Midwest	20	RW	99.2	2.37 (280)*		
		GR	28.7	2.35 (280)*	13.3 (28)*	86.9
		ST	54.6	3.07 (280)*		
Lower Plains	6	ST	10.8	0.79 (220)*		
		GR	0.4	0.25 (102)†		
		ST	0.6	0.18 (102)†		
	19	RW	25.4	1.04 (188)*	12.5 (20)†	61.3
		GR	32.5		23.5 (20)*	125.0
		CB	16.5	0.62 (188)*		
	33	RW	38.5	1.97 (393)*	15.4 (43)*	68.4
		GR	23.0	1.35 (393)*	14.4 (43)*	98.6
		ST	14.6		5.2 (43)*	46.4
	34	CB	39.3		12.2 (19)†	36.0
		RW	18.3	1.86 (-45)*		
		GR	0.9	0.13 (-45)*		
Upper Plains	35	CB	1.7	0.15 (-45)†		
		ST	3.0	0.53 (-45)†		
		RW	4.0	0.41 (104)*		
	53	CB	25.6	1.19 (104)*	11.1 (-8)†	45.3
		GR	69.7	-2.38 (350)*		
		CB	25.5	0.99 (350)*	6.8 (43)†	32.5
	36	ST	49.0	1.54 (350)†	13.9 (43)†	31.1
		CB	8.4	-0.41 (127)†		
		CB	40.6	1.06 (177)†		
	37	ST	14.1	1.37 (177)†		
		RW	75.3		-51.7 (-8)*	-40.7
		GR	8.3	1.24 (137)*		
Southwest	38	CB	24.2	2.01 (137)*	19.0 (-8)*	67.6
		ST	13.7	1.70 (137)*	3.0 (-8)*	81.1
		GR	6.8		3.8 (27)†	84.4
	39	CB	16.0	0.89 (240)*	4.8 (27)†	42.5
		GR	88.3		36.4 (18)*	55.7
		CB	23.5	1.66 (159)*	11.9 (18)†	74.8
	40	ST	1.6	0.22 (112)*		
		RW	258.3	-38.36 (-61)†		
		CB	5.3	-1.43 (-61)†		
Northwest	81	RW	2.5	0.29 (-44)*		
		ST	3.2	0.69 (-44)*		
		RW	21.4	2.17 (104)*	13.0 (10)*	76.9
	88	CB	0.9		1.4 (-9)†	66.7
		ST	10.5		-5.2 (-9)*	-54.2
		CB	4.2	0.50 (220)*		
	92	ST	58.2		48.7 (-7)†	121.4
		GR	1.2	0.13 (-36)†		
		CB	2.7	0.29 (-36)†		
	62	ST	12.0	1.47 (-36)†		
		RW	3.2	0.60 (-66)*		
		CB	6.2		2.2 (-5)†	115.8
	67	ST	24.2	5.59 (-66)†		
		RW	55.3	6.36 (-68)†		
		ST	36.1	5.49 (-68)†		
	85	CB	5.8	0.51 (125)†	2.7 (-9)*	270.0
		RW	11.3	1.17 (191)*		

^aFigures in parentheses are degrees of freedom.^bSee Table 3 for symbols denoting probability level.^cFigures in parentheses are number of paired routes.

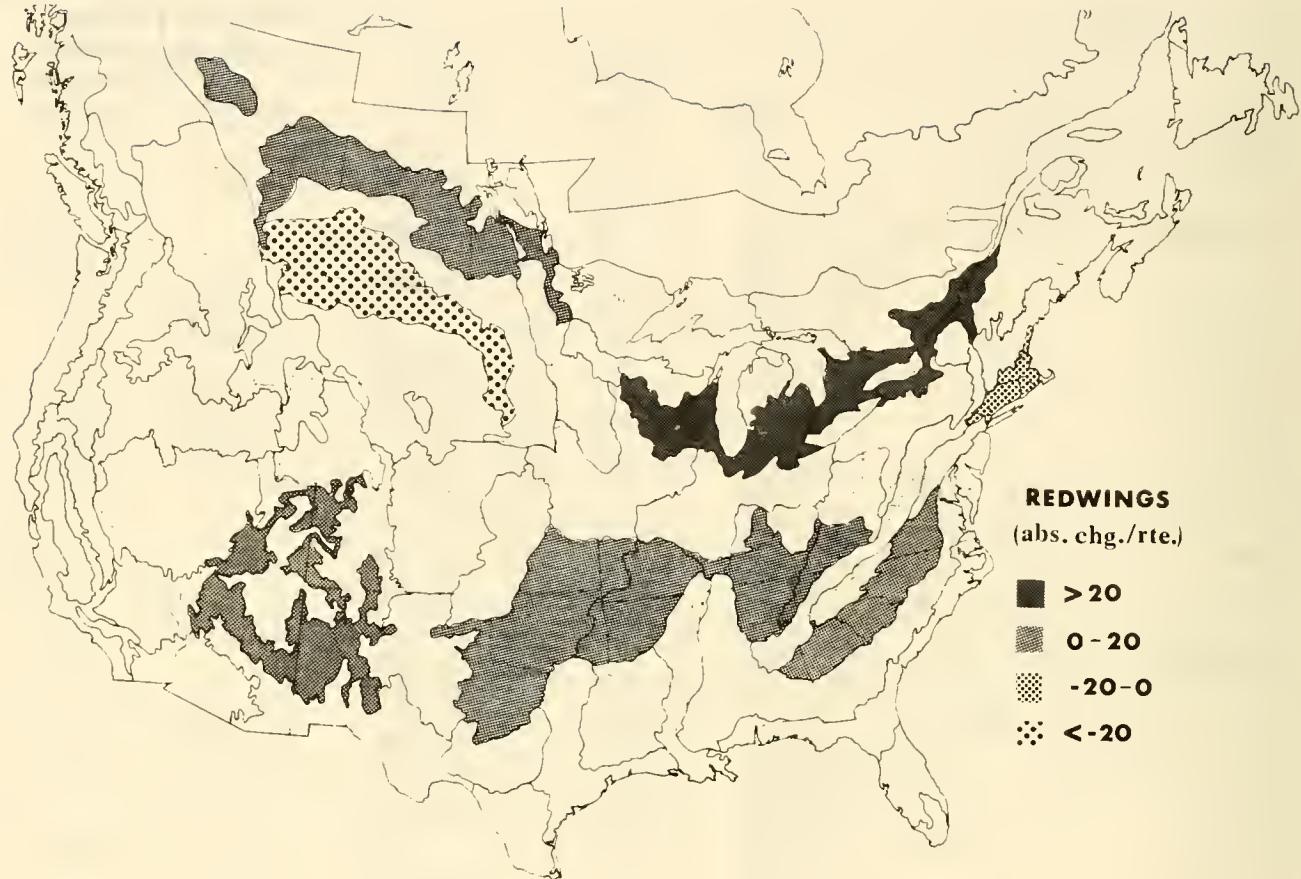


Fig. 8. Strata indicating a significant ($P \leq 0.05$) difference in mean number of red-winged blackbirds per route for routes run in 1966-68 compared to 1974-76, based on data from Table 4.

was almost twice that for any other stratum. The absolute change in mean birds per route (98.4) from 1966-68 to 1974-76 also was almost twice that of any other stratum. Adjacent Strata 16, 17, and 20 also had significant annual rates of change, indicating a consistent pattern of population increase in redwings from the St. Lawrence Valley of Quebec through the southern Great Lakes into Minnesota (Fig. 7). Six strata showed significant declines in annual rates of change, the greatest occurring in southwestern Arizona (Stratum 82). Two strata showed significant declines in paired-route comparisons (1966-68:1974-76); the greatest was in the Upper Plains area of the United States and Canada (Stratum 38).

Grackles showed significant increases from 1966 to 1976 in 10 strata on the basis of annual rates of change and 8 strata on the basis of paired-route comparisons (1966-68:1974-76). The greatest increases occurred in Strata 11 (Southeast Piedmont), 40 (Dakotas-Minnesota boundary), and the adjacent Strata 19 and 33

(Central Lower Plains). The only strata indicating significant declining populations were 32 (Iowa), and 23, 10, and 12 in the Appalachia-Northeast regions (Figs. 9, 10).

Cowbirds, on a stratum level, experienced a rather complex pattern of population increase and decrease from 1966 to 1976. The greatest increases occurred in the Central Plains areas (Strata 32, 38, 34, 40) but significant increases also occurred in strata from the southeast and Gulf Coast to California. Significant declines were most obvious in strata in the Appalachia, Northeast, and Ohio Valley areas (Figs. 11, 12).

Starling populations showed significant increases during 1966-76 in 17 strata on the basis of annual rate of change and 5 strata on the basis of paired-route comparisons (1966-68:1974-76). The major increases occurred in California (Stratum 92) and the southern Great Lakes (Strata 16, 20). The major declines suggested were in the Adirondacks-New England area (Strata 26, 27) and the central Appalachia area

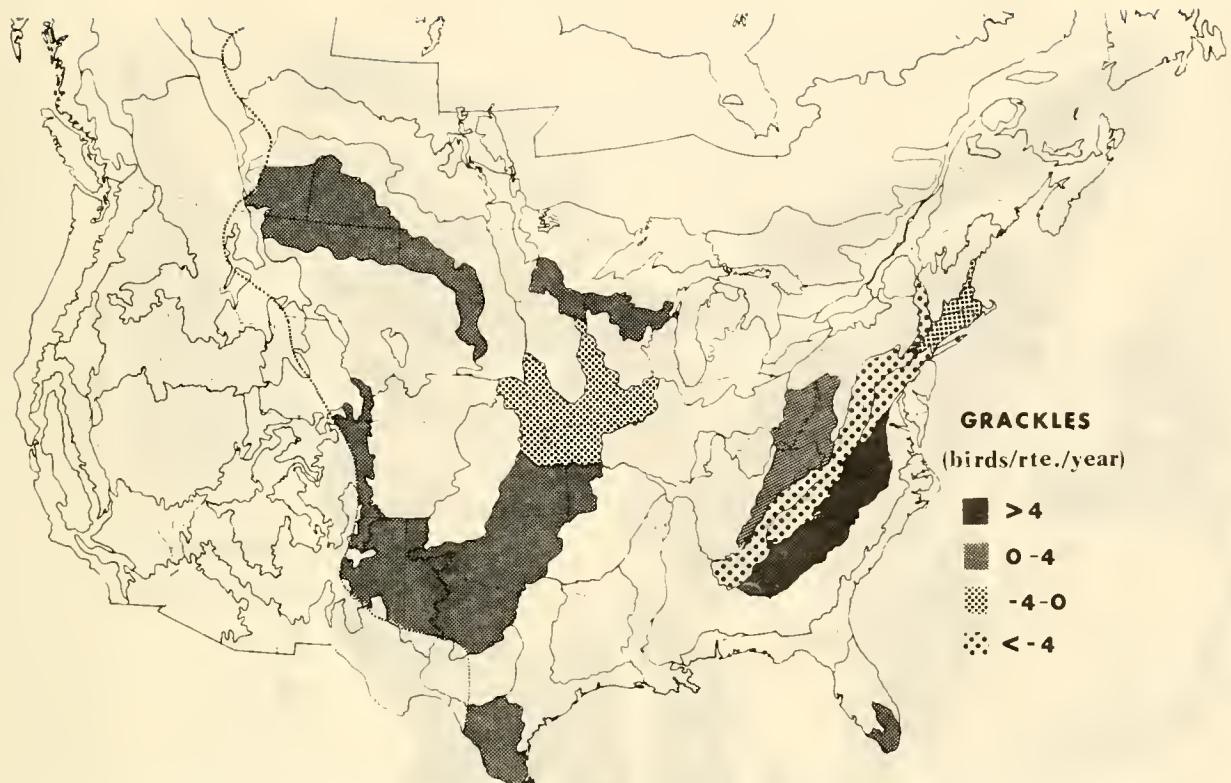


Fig. 9. Strata indicating a significant ($P \leq 0.05$) annual rate of change for common grackles, 1966-76, based on data from Table 4.

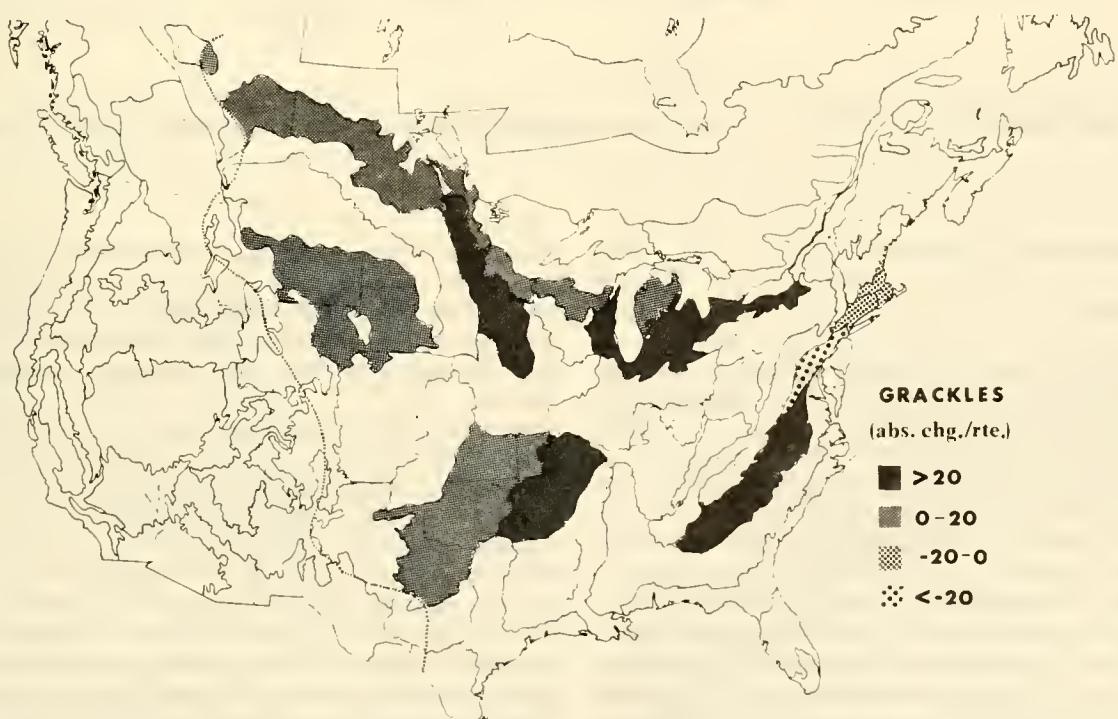


Fig. 10. Strata indicating a significant ($P \leq 0.05$) difference in mean number of common grackles per route for routes run in 1966-68 compared to 1974-76, based on data from Table 4.

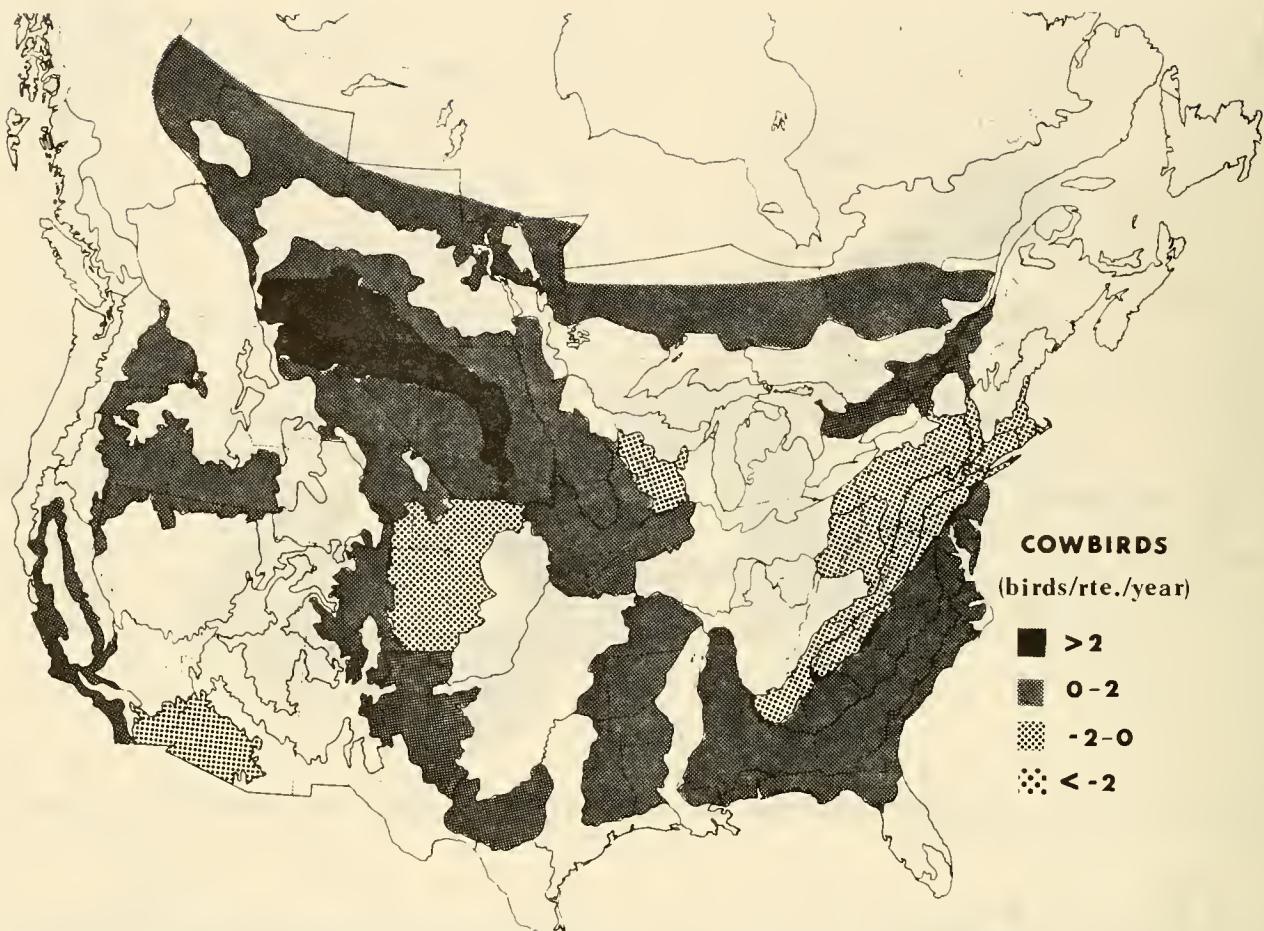


Fig. 11. Strata indicating a significant ($P \leq 0.05$) annual rate of change for brown-headed cowbirds, 1966-76, based on data from Table 4.

(Stratum 13; Figs. 13, 14).

Substrata

Appendix 2 lists for redwings, grackles, cowbirds, and starlings year-by-year population trends, annual rate of change, paired-route comparisons (1966-68:1974-76), and appropriate significance levels for each substratum by State or Province. Tables 6-9 list the 10 substrata showing the greatest positive and negative annual rates of change that were significant for these respective species. Figures 15-18 show all substrata having significant annual rates of change, 1966-76, for these same respective species. These figures and Appendix 2 point out areas of change not depicted at the regional and stratum level of analysis and provide the most detailed view of population change now available.

Among redwings, the greatest increases occurred in

southern California, southeast Wisconsin, and upper New York. A major area of consistent increase appeared to be in the Mississippi Valley from Wisconsin to Louisiana. Major decreases were recorded in Arizona, southern New York, Pennsylvania, and Indiana (Fig. 15).

Analysis at the substratum level for grackles indicated a block of major increase in Ohio, as well as in the Dakotas. Major declines occurred through the Appalachia and Chesapeake Bay areas (Fig. 16).

Cowbirds increased the most in the central and northern prairie States. All 10 substrata showing greatest positive rates of change in Table 8 were located from Saskatchewan to Oklahoma. The most apparent cluster of substrata showing declines was in the eastern and midwestern States from eastern New York through Ohio to Wisconsin (Fig. 17).

Starlings showed substantial increases in the substrata around the lower Great Lakes, particularly

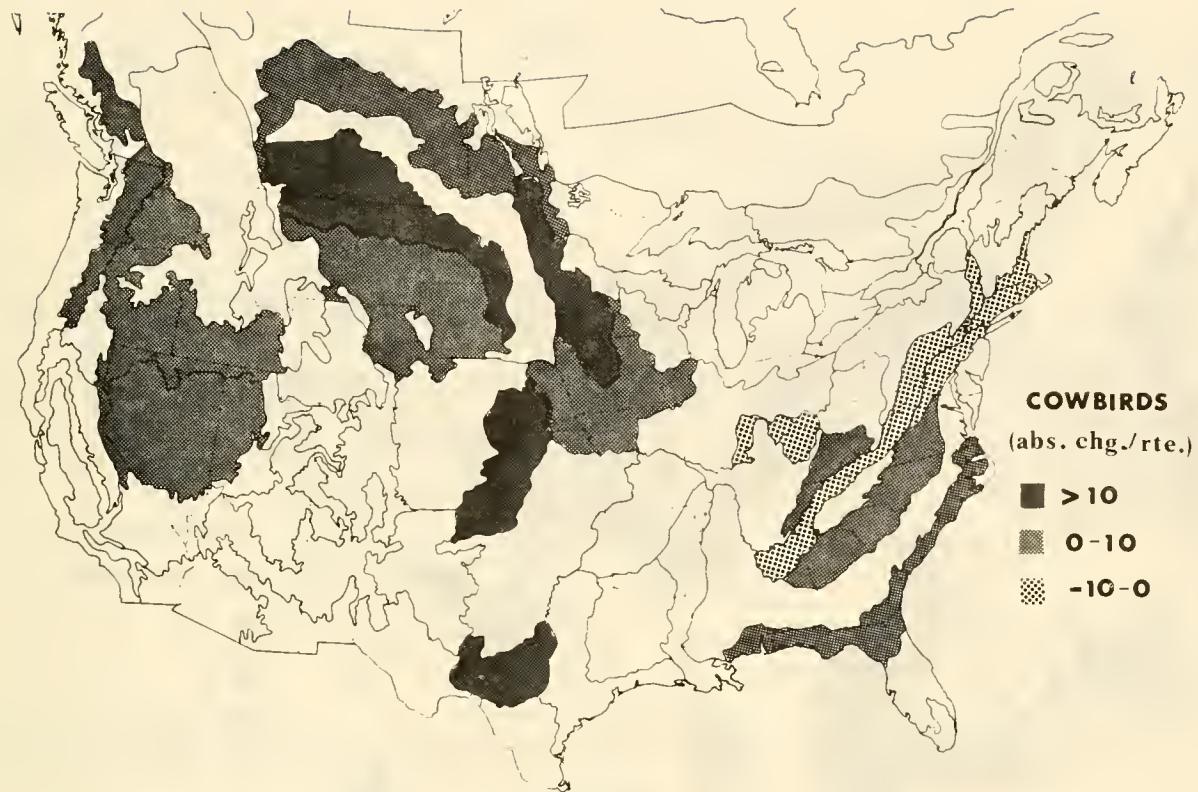


Fig. 12. Strata indicating a significant ($P \leq 0.05$) difference in mean number of brown-headed cowbirds per route for routes run in 1966-68 compared to 1974-76, based on data from Table 4.

Lake Michigan, in central California, and in the central Kentucky area. Few major decreases were revealed; the most significant by far were in western Virginia and western Maryland (Fig. 18).

States and Provinces

The analyses of population change on a substratum or stratum level should be the most meaningful and sensitive ecologically because of the supposed similarity of habitat and bird population densities throughout the geographical unit. However, population changes at the State or Province level are of interest to many people and particularly to agencies that deal with bird-people conflicts within political units. Thus, along with the analyses of population trends for all substrata in each State and Province summarized in Appendix 2, we also present the same information for each State and Province. Table 10 lists for redwings, grackles, cowbirds, and starlings all States and Provinces showing significant annual rates of change (1966-76) or significant differences in mean birds per route for routes run in both 1966-68 and 1974-76. Table 5 summarizes the number of States and

Provinces with significant population changes for each species.

California, Wisconsin, Missouri, and Illinois showed the greatest increases during 1966-76 for redwings, whereas Arizona, Ohio, Indiana, and Connecticut indicated the greatest decreases. For grackles, Ohio, Indiana, and Minnesota evidenced the greatest increases, whereas Virginia, Maryland, and Iowa had the greatest declines. Cowbirds increased most in South Dakota, Iowa, Montana, and Minnesota and declined most in Arizona, Connecticut, New Brunswick, Virginia, and Ohio. Starlings showed their greatest increases in British Columbia, Kentucky, California, Rhode Island, and Manitoba. The only States or Provinces indicating significant declines in starlings were Virginia, Quebec, Maine, Ontario, and Mississippi.

Illinois is the only State or Province for which we have historical data of a quantitative nature on blackbird and starling populations (Graber and Gruber 1963). Redwing populations approximately doubled from 1908 to 1958, whereas grackle and cowbird populations showed slight declines. The population trends for 1966-76 indicated similar trends are still occurring

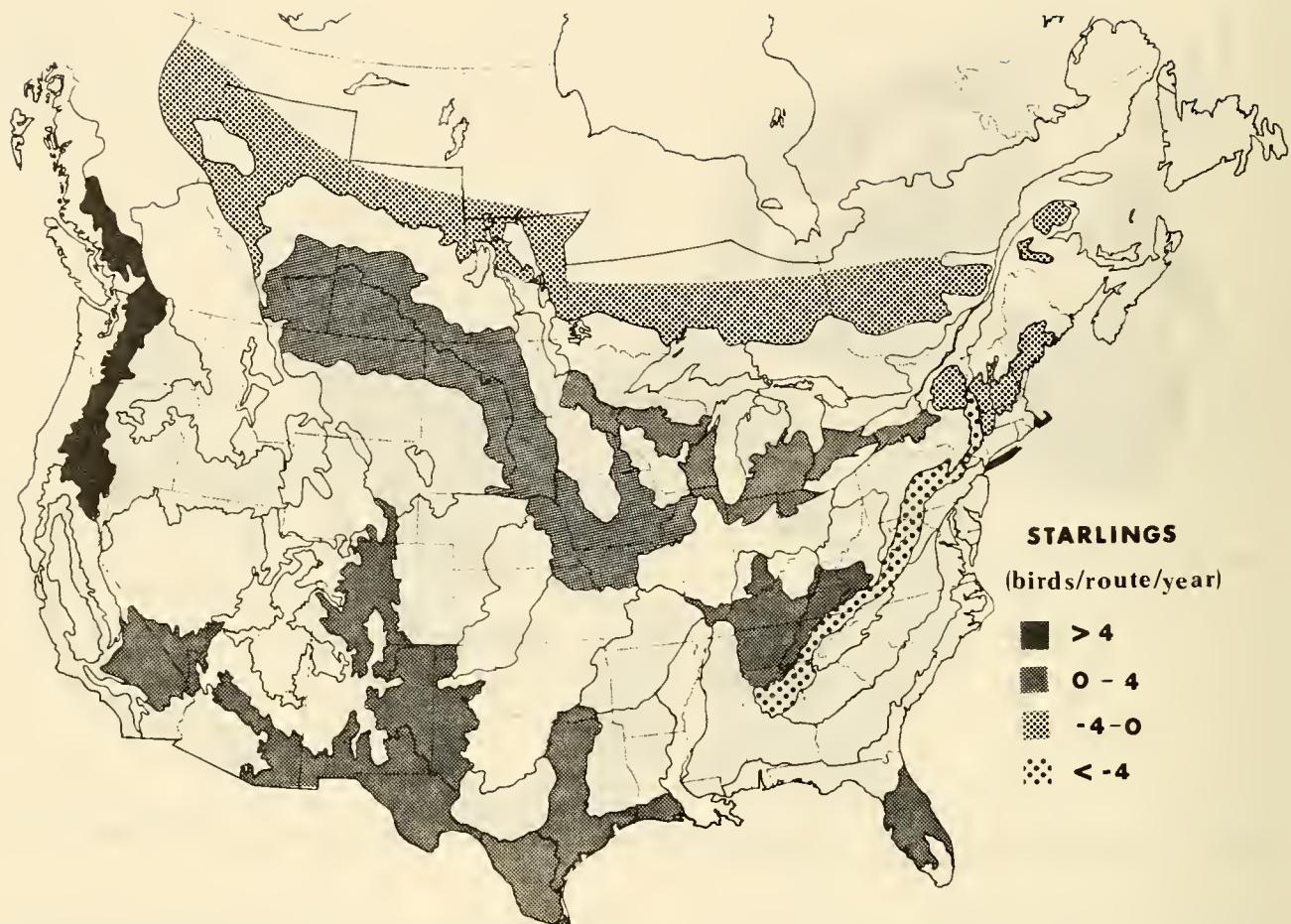


Fig. 13. Strata indicating a significant ($P \leq 0.05$) annual rate of change for starlings, 1966-76, based on data from Table 4.

(Appendix 2). The annual rate of change for redwings was significantly positive on a Statewide basis. The major increase occurred in Substratum 31 which covers 71% of the State. Stable populations were indicated for both grackles and cowbirds from 1966 to 1976. Starlings were not in the State in 1906-09; in 1957 they were the seventh most common species. No significant increase in starlings occurred from 1966 to 1976.

Discussion

This report documents population trends for redwings, grackles, cowbirds, and starlings from 1966 to 1976 and will not attempt any analysis of why population changes have occurred, although a few general comments will be made. The main intent of the following discussion is to comment on various bird-people conflicts in relation to population changes from 1966 to 1976.

The analyses of Breeding Bird Survey data have revealed a rather complex pattern of population change over North America for these four species. For the four species combined, significant population increases at the substratum, stratum, and State level outnumbered declines by a factor of at least 2 to 1 (Table 5). Although all species declined in at least some areas, there has been a net increase on a continental scale of redwing, cowbird, and starling populations. Grackles, although not indicating a population increase on a continental level, have definitely increased in parts of the Midwest and Lower and Upper Plains regions. These population changes help explain some of the bird-people conflicts we have today.

Winter Roosts in Southeastern United States

The increase in complaints concerning winter-roosting populations of blackbirds and starlings in the southeastern United States, particularly Tennessee

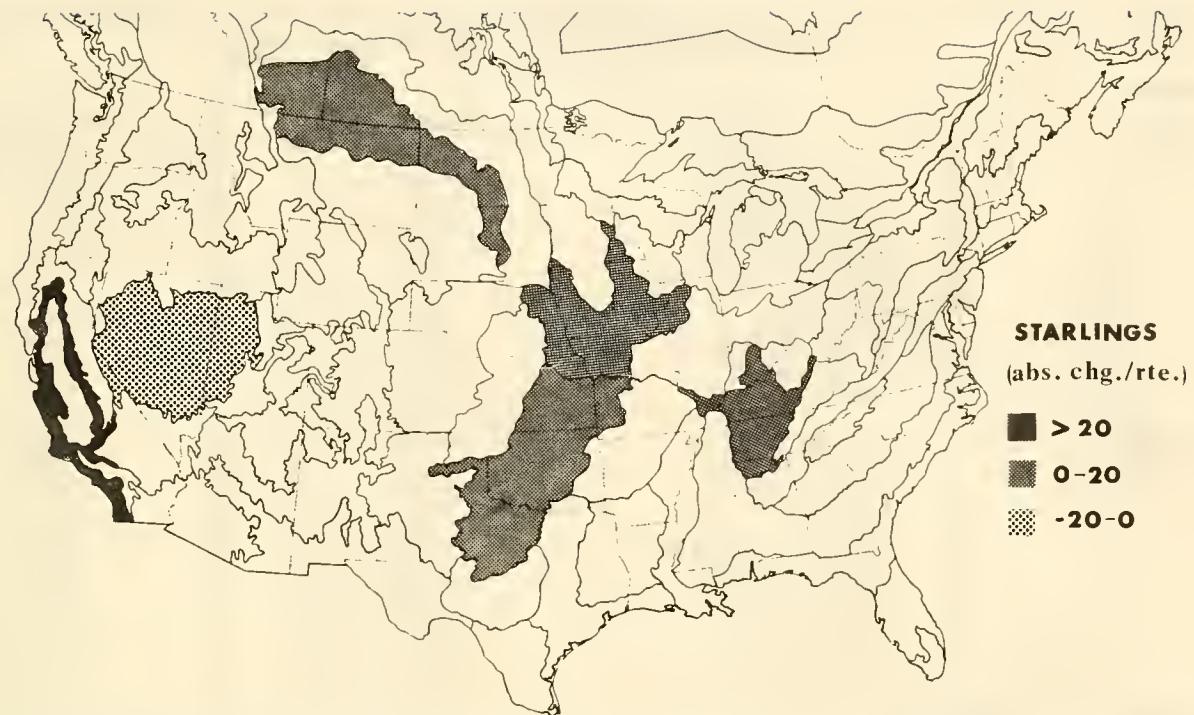


Fig. 14. Strata indicating a significant ($P \leq 0.05$) difference in mean number of starlings per route for routes run in 1966-68 compared to 1974-76, based on data from Table 4.

Table 5. Number of strata, substrata, and United States States and Canadian Provinces with significant ($P \leq 0.05$) annual rates of change (slope) for 1966-76 and/or significant mean paired difference for routes run at least once in 1966-68 and 1974-76 for red-winged blackbirds, common grackles, brown-headed cowbirds, and starlings per Breeding Bird Survey route.

Geographic area	Species	Slope			Paired route comparison			Insuff. data (< 5 rts.) or out of range	
		Pos.	Neg.	Zero	1974-76 minus 1966-68				
					Insuff. data (< 20 df) or out of range	Pos.	Neg.		
Stratum (N=62)	Redwing	22	7	30	3	10	2	34	16
	Grackle	10	6	30	16	8	2	30	22
	Cowbird	16	9	33	4	13	4	29	16
	Starling	17	4	38	3	5	1	40	16
	Totals	65	26	131	26	36	9	133	70
Substratum (N=239)	Redwing	47	22	98	72	9	2	79	149
	Grackle	28	18	94	99	8	4	73	154
	Cowbird	35	15	116	73	7	8	75	149
	Starling	23	10	134	72	4	0	86	149
	Totals	133	65	442	316	28	14	313	601
State or Province (N=57)	Redwing	17	7	32	1	11	2	39	5
	Grackle	13	7	28	9	10	2	33	12
	Cowbird	17	8	31	1	9	3	40	5
	Starling	13	5	38	1	8	0	44	5
	Totals	60	27	129	12	38	7	156	27

Table 6. *The 10 substrata in the United States and Canada with greatest annual rates of change (1966-76) for mean number of red-winged blackbirds per Breeding Bird Survey route.*

Direction of slope	Rank	Substrata ^a	Slope	df	Mean birds/route
Increase	1	SE California (82)	92.12 ^b	32	641.6
	2	SE Wisconsin (16)	17.92*	104	318.6
	3	NE New York (18)	15.72*	24	162.2
	4	E Arkansas (5)	14.09*	61	273.7
	5	SW Kentucky (4)	12.83*	23	91.1
	6	NE Missouri (31)	12.38*	22	151.5
	7	N Illinois (16)	11.45*	24	160.4
	8	SW Saskatchewan (38)	11.45*	24	82.9
	9	SC Colorado (84)	11.64*	34	122.5
	10	C Illinois (31)	10.21*	193	205.4
Decrease	1	SW Arizona (82)	-80.47*	29	134.6
	2	S Alberta (38)	-7.26*	41	58.3
	3	NW Illinois (32)	-7.20*	60	181.8
	4	C Indiana (31)	-7.18#	53	222.3
	5	SW Pennsylvania (22)	-6.33*	63	102.2
	6	E South Carolina (3)	-6.27*	41	30.9
	7	E New York (13)	-5.21*	118	162.2
	8	C Maryland (10)	-4.14*	159	85.0
	9	Connecticut (12)	-3.58*	82	56.3
	10	SW New York (24)	-3.58*	299	157.9

^aStratum number in parentheses.

^bProbability level $P \leq 0.01 = *; 0.01 < P \leq 0.05 = #.$

Table 7. *The 10 substrata in the United States and Canada with greatest annual rates of change (1966-76) for mean number of common grackles per Breeding Bird Survey route.*

Direction of slope	Rank	Substrata ^a	Slope	df	Mean birds/route
Increase	1	NW Ohio (16)	12.06 ^b	49	125.1
	2	SE Louisiana (5)	9.40#	37	133.0
	3	NC South Dakota (38)	7.86*	26	57.7
	4	WC Missouri (33)	7.21*	25	71.8
	5	E North Dakota (40)	6.58*	35	42.8
	6	C South Carolina (4)	6.17#	36	104.6
	7	SE Wisconsin (16)	5.70#	104	103.4
	8	C Kentucky (14)	5.18#	165	166.4
	9	W Ohio (31)	4.98*	110	121.3
	10	SE Ohio (22)	4.38*	114	62.2
Decrease	1	Western Virginia (13)	-50.76*	63	189.3
	2	S Illinois (14)	-20.80#	30	152.2
	3	W Mississippi (5)	-16.60*	23	111.8
	4	E West Virginia (13)	-15.00#	42	17.8
	5	SE Pennsylvania (10)	-14.41*	105	257.4
	6	W Maryland (13)	-13.63*	21	123.1
	7	C Maryland (10)	-10.61*	159	164.4
	8	NC Kentucky (15)	-7.80*	77	217.5
	9	E Tennessee (13)	-7.27*	76	117.6
	10	NW Illinois (32)	-5.10*	60	83.2

^aStratum number in parentheses.

^bProbability level $P \leq 0.01 = *; 0.01 < P \leq 0.05 = #.$

Table 8. *The 10 substrata in the United States and Canada with greatest annual rates of change (1966-76) for mean number of brown-headed cowbirds per Breeding Bird Survey route.*

Direction of slope	Rank	Substrata ^a	Slope	df	Mean birds/route
Increase	1	C South Dakota (38)	5.17 ^b	26	35.0
	2	SW Saskatchewan (38)	4.77*	24	26.2
	3	C Saskatchewan (37)	3.24*	22	36.0
	4	SW North Dakota (39)	2.35*	70	39.0
	5	NC Iowa (40)	2.29*	38	29.3
	6	N Montana (38)	2.23*	24	8.0
	7	E Oklahoma (19)	2.04#	32	23.3
	8	EC Alberta (37)	1.85*	16	11.5
	9	SW Minnesota (40)	1.79*	67	16.7
	10	W South Dakota (39)	1.67*	88	26.3
Decrease	1	W Oregon (93)	-1.48*	70	11.4
	2	SW Wisconsin (17)	-1.30*	143	24.5
	3	Long Is. New York (8)	-1.14*	21	5.0
	4	C Michigan (20)	-0.95*	62	22.2
	5	NE Ohio (24)	-0.88#	60	13.4
	6	New Brunswick (28)	-0.85*	171	13.6
	7	SE Michigan (16)	-0.81*	113	14.7
	8	W Texas (81)	-0.74#	65	8.1
	9	E New York (13)	-0.73*	118	7.6
	10	NE West Virginia (24)	-0.58*	58	6.9

^aStratum number in parentheses.

^bProbability level $P \leq 0.01 = *; 0.01 < P \leq 0.05 = #.$

Table 9. *The 10 substrata in the United States and Canada with greatest annual rates of change (1966-76) for mean number of starlings per Breeding Bird Survey route.*

Direction of slope	Rank	Substrata ^a	Slope	df	Mean birds/route
Increase	1	N Illinois (16)	17.86 ^b	24	210.5
	2	Rhode Island (12)	15.04*	22	159.2
	3	SE Wisconsin (16)	7.43*	104	143.2
	4	S Alberta (38)	6.07*	41	32.5
	5	SE California (82)	5.96*	32	31.0
	6	N Michigan (28)	5.60*	49	55.2
	7	NE Ohio (24)	5.18*	60	130.9
	8	NE California (85)	4.84#	37	33.7
	9	C Michigan (20)	4.82*	62	83.4
	10	C Kentucky (14)	4.31*	165	75.7
Decrease	1	Western Virginia (13)	-21.60*	63	100.8
	2	W Maryland (13)	-10.14*	21	103.3
	3	S Maine (27)	-5.07*	54	65.9
	4	SW Pennsylvania (22)	-4.55#	63	95.4
	5	W Mississippi (5)	-4.28*	23	28.5
	6	N Ontario (29)	-2.56*	59	13.2
	7	NE New York (26)	-1.83#	103	39.9
	8	W Montana (64)	-1.61*	25	6.7
	9	S Arkansas (4)	-0.86#	68	7.8
	10	C Alabama (4)	-0.37#	165	15.7

^aStratum number in parentheses.

^bProbability level $P \leq 0.01 = *; 0.01 < P \leq 0.05 = #.$

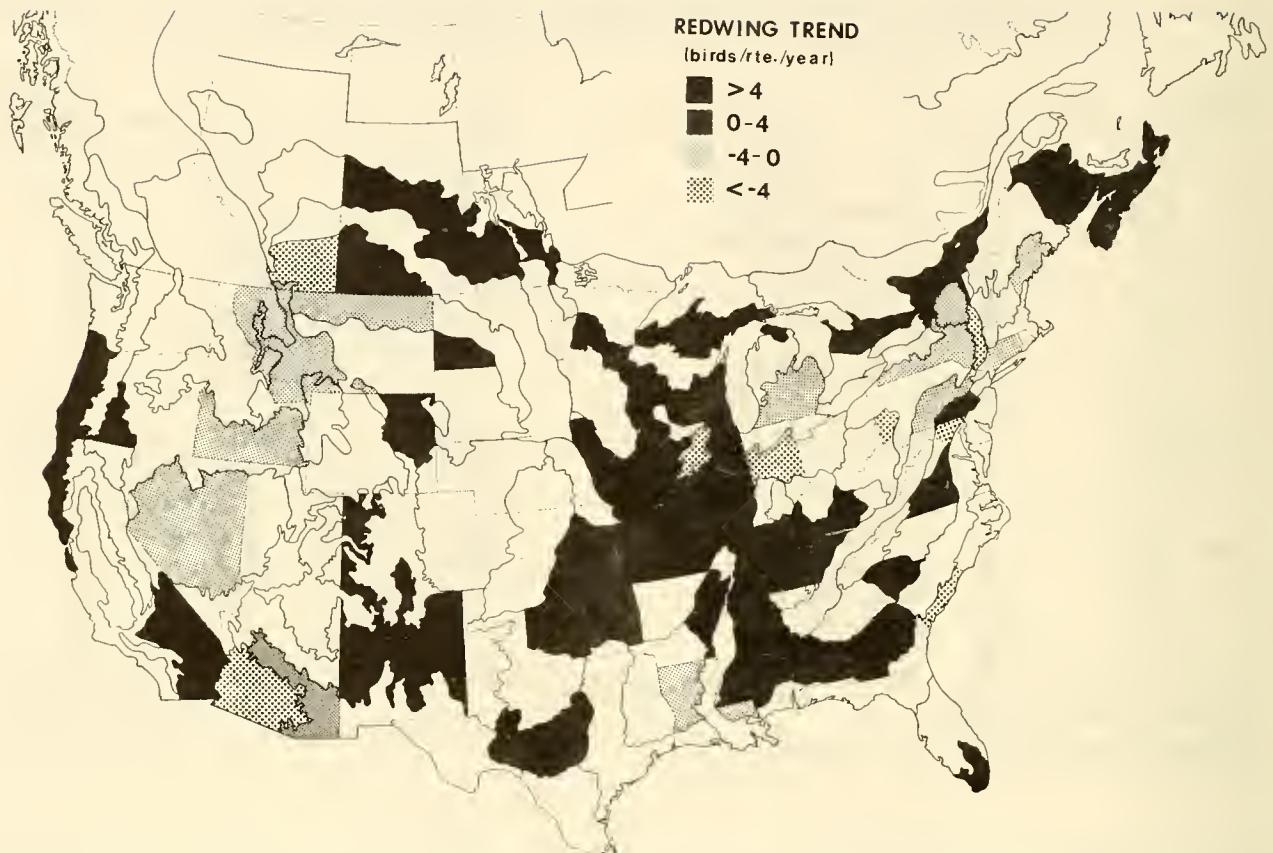


Fig. 15. Substrata indicating a significant ($P \leq 0.05$) annual rate of change for red-winged blackbirds, 1966-76. Substrata with less than 20 df are excluded.

and Kentucky in the early 1970's, has generated much speculation on whether or not breeding populations of these species have increased in recent years. Meanley (1975) suggested that the increase in complaints has mainly resulted from increased public awareness and that the populations of blackbirds have remained relatively stable. Monroe and Cronholm (1977) hypothesized that the increase in problems related to roosts in Tennessee and Kentucky was not related to breeding population increases but to a series of mild winters that permitted roosting populations to winter north of traditional areas.

Although both of these factors may play a role in the increasing conflicts, the Breeding Bird Survey data do indicate that breeding populations of grackles, starlings, and possibly redwings that overwinter in the Tennessee-Kentucky area have increased in the past decade. Grackles and starlings are the dominant species in upland roosts (Meanley 1965, 1976) and are responsible for most of the recent conflicts (Dolbeer et al. 1978).

Grackles increased significantly in the Midwest region, particularly in Ohio (49%), Wisconsin (33%),

and Indiana (31%) (Tables 3, 10). Meanley (1976) showed that of the 117 grackles banded in Ohio, Wisconsin, and Indiana during the breeding season and recovered during the winter-roost period, 66% of the recoveries occurred in Tennessee, Kentucky, Alabama, and Mississippi.

Starlings have also increased significantly in the Midwest region, particularly in Kentucky (41%), northeastern Ohio (annual rate of increase = 5.18 birds per route), and central Michigan (annual rate of increase = 4.82 birds per route) (Tables 3, 9, 10). Band analyses by Monroe and Cronholm (1977) and Royall (1977) indicated that 40-47% of the starlings wintering in Tennessee and Kentucky are locally produced and most of the remainder come from an area to the north roughly corresponding to our Midwest region and the western half of our Appalachia region.

Redwings from the Midwest region, which mainly overwinter in the southeastern United States (Burtt and Giltz 1977; Dolbeer 1978), have also shown an overall significant increase of 14% (Table 3), although significant declines have been registered in parts of Ohio and Indiana. Cowbirds have not increased in the

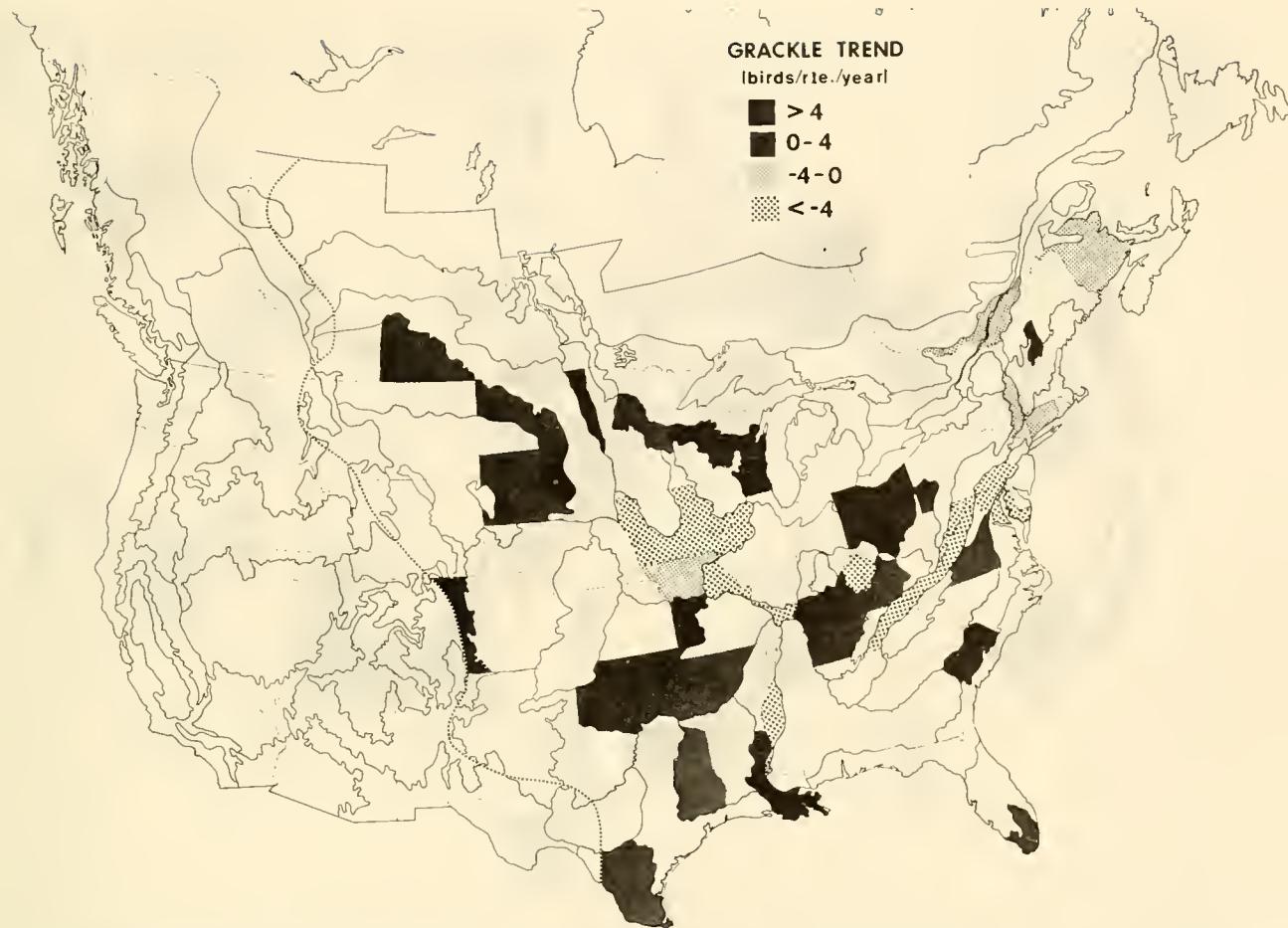


Fig. 16. Substrata indicating a significant ($P \leq 0.05$) annual rate of change for common grackles, 1966-76. Substrata with less than 20 df are excluded.

Midwest. They are normally a minor species in problem roost sites in the southeastern States.

Redwing Damage to Corn

Redwings have long been notorious for their propensity for damaging maturing corn (e.g., Cardinell and Hayne 1945). Although almost all corn-growing areas in North America experience at least some blackbird damage (Stone et al. 1972), the severity of the problem appears to wax and wane for various localities.

In the past few years, corn growers in the St. Lawrence Valley of Quebec have complained of increasingly severe damage to corn by redwings. The legitimacy of these complaints has been substantiated by detailed field studies (Martin 1977; Potvin et al. 1976) indicating high levels of damage in some places. Our analysis indicates that this area (Stratum 18) had the highest yearly rate of increase (15.8 birds per route) and greatest absolute change from 1966-68 to 1974-76

(98.4 birds per route) of any stratum (Table 4). Thus, the increase in damage and farmers' complaints appear to be directly related to increased population levels of redwings as measured by the Breeding Bird Survey.

There also have been increased complaints of blackbird damage to maturing corn in Tennessee and Kentucky in recent years, although the overall damage level in these States appears to be low (Stickley et al. 1978). At least some of the increased attention to this problem may be the result of the increases in the breeding population of redwings in Tennessee and Kentucky during 1966-76 (Table 10). The magnitude of population increases was not, however, nearly as great as in Stratum 18 in Quebec.

Ohio, which has long suffered from redwing damage to maturing corn (Giltz and Stockdale 1960), is the only State where damage surveys have been conducted in a consistent manner over a period of years. No relationship was apparent between Statewide estimates of

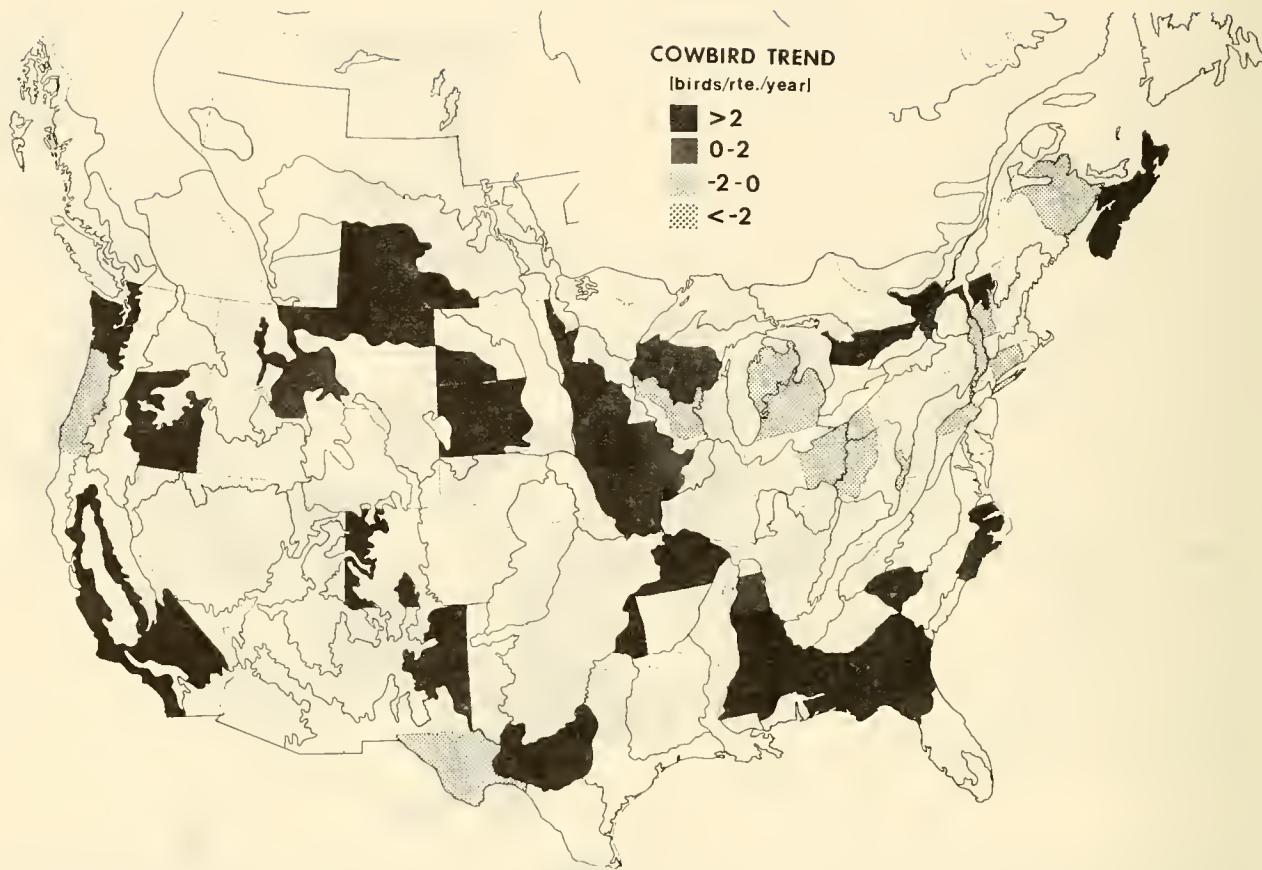


Fig. 17. Substrata indicating a significant ($P \leq 0.05$) annual rate of change for brown-headed cowbirds, 1966-76. Substrata with less than 20 df are excluded.

corn loss from 1968 through 1976 and Statewide population indices of redwings for the same years (Fig. 19). Population indices for redwings in Ohio indicate a general decline since the early 1970's (Table 10; Appendix 2). We cannot account for this lack of correlation other than to suggest that in some situations factors such as agricultural practices and environmental changes may have as much or more influence on damage levels than do bird population levels. Our subjective impression, based on the number of farmer complaints and the decreasing use of bird-damage control chemicals to protect corn in Ohio (Cote and Woronecki 1978), is that the severity of bird damage to corn has declined in recent years.

Starlings in the Western United States

The starling was first observed in California in 1942 and the subsequent rapid increase of wintering populations has been documented through 1971 by analysis

of Christmas Bird Count data (DeHaven 1973). Our analyses reveal that breeding populations have increased dramatically in California from 1968 to 1976, particularly in Stratum 92. For the entire State, the mean number of starlings per route for the 22 routes run in 1968 and again in 1974-76 increased 191% from 16 to 47 (Table 10). Starling populations have doubled for the entire Southwest region (Table 3) over this period.

Starling populations in the West have already caused considerable conflict with agriculture, particularly grapes in California (Clore 1976; Crase et al. 1976). These conflicts are likely to intensify with increasing numbers of starlings.

Another area with the potential for increased conflict is in Michigan (especially Stratum 20) where the starling population has increased significantly in the past decade (Tables 9, 10). Michigan is the major producer of highbush blueberries and tart cherries, both of which are commonly fed upon by the starling (Virgo 1971; Mott and Stone 1973; Stone 1973).



Fig. 18. Substrata indicating a significant ($P \leq 0.05$) annual rate of change for starlings, 1966-76. Substrata with less than 20 df are excluded.

Cowbird Parasitism

The cowbird population is much greater today in Michigan and other areas of eastern United States and Canada than before the clearing of timber in the 1800's (De Vos 1964). This increase in cowbird population in the pine barrens area of central Michigan over the last century is thought by many biologists to be an important factor in the decline of the Kirtland's warbler (*Dendroica kirtlandii*) population to a precarious level of about 400 birds (Walkinshaw and Faust 1974). Between 1972 and 1976 over 17,000 cowbirds have been removed from the restricted nesting area of the endangered Kirtland's warbler (D. A. Andrews, personal communication) in a successful attempt to reduce nest parasitism (Walkinshaw and Faust 1974).

Our data analyses indicate that the cowbird population in the breeding range of Kirtland's warbler (Stratum 20 in Michigan) has remained stable or declined from 1966 to 1976 and it has significantly declined south of this area in southern Michigan (Stratum 16) and in portions of Ohio, Indiana, and Wisconsin. Thus,

unlike the starling in the western United States, the cowbird population in the Great Lakes region apparently has stabilized or even slightly declined after an earlier period of expansion. A program of cowbird removal in the breeding range of Kirtland's warbler may have to continue to keep nest parasitism at low rates; however, the cowbird population trends indicate that at least the Kirtland's warbler population is not being subjected to the increasing pressure of an expanding cowbird population.

An example of an area where an increasing cowbird population may be influencing the abundance and even survival of other avian species is in central Texas. Cowbird numbers have increased significantly in Stratum 53 from 1966 to 1976 (Appendix 2). This increase has coincided with declines in black-capped vireos (*Vireo atricapilla*) and golden-cheeked warblers (*Dendroica chrysoparia*) in the same area, species often heavily parasitized by cowbirds (Oberholser 1974). Habitat changes have probably been the major influence in the decline of these two species; however, the added influence of an increasing cowbird population may be important.

Table 10. States or Provinces indicating significant ($P \leq 0.05$) annual rate of change (slope) in number of birds per Breeding Bird Survey route (1966-76) and/or a significant difference in mean number of birds per route for routes run at least once in 1966-68 and 1974-76 for red-winged blackbirds (RW), common grackles (GR), brown-headed cowbirds (CB), and starlings (ST). Slopes with less than 20 df and paired-route comparisons with less than five routes are excluded.

Province or State	Species	Mean birds/ route	Slope (1966-76)	Paired route comparison 1974-76 minus 1966-68	
				Difference	Percent change
Alabama	CB	7.9	0.25 (345) ^a #		
Alberta	CB	8.3		7.1 (-4)*	62.3
Arizona	RW	38.9	-22.90 (-99)*		
	CB	6.2	-0.65 (-99)#		
Arkansas	RW	93.9	4.49 (223)*	34.7 (26)#	55.2
	GR	35.9	1.86 (223)*		
British Columbia	CB	6.2	0.71 (148)*		
	ST	31.9	4.68 (148)*		
California	RW	84.3	8.10 (667)*		
	CB	4.0		1.4 (22)#	107.7
	ST	30.1	2.19 (667)*	30.6 (22)#	191.2
Colorado	RW	40.9	1.98 (120)#	22.1 (-9)#	56.2
	CB	2.0	0.32 (120)*	3.1 (-9)*	516.7
	ST	12.3		6.6 (-9)*	103.1
Connecticut	RW	56.3	-3.58 (-82)*	-34.2 (-7)#	-45.0
	GR	33.5	1.69 (-82)#		
	CB	7.6	-0.52 (-82)*	-6.1 (-7)*	-50.8
Florida	GR	33.6	0.99 (287)#		
	CB	0.7	0.05 (287)*		
	ST	6.1	0.47 (287)*		
Georgia	CB	3.7	0.26 (156)#		
Idaho	ST	51.0		16.1 (-3)#	108.8
Illinois	RW	198.1	7.95 (309)*		
Indiana	RW	178.6	-3.89 (139)#		
	GR	106.9	5.01 (139)#	24.6 (16)#	31.0
Iowa	RW	161.3	5.31 (215)*		
	GR	63.3	-3.03 (215)*	-21.6 (29)*	-27.9
	CB	20.3	1.17 (215)*	7.7 (29)*	51.7
	ST	59.2		16.4 (29)#	29.6
Kansas	RW	81.1		15.5 (27)#	24.7
	ST	19.8		7.1 (27)#	48.3
Kentucky	RW	56.0	4.05 (314)*	29.5 (32)*	69.1
	ST	71.9	3.85 (314)*	27.4 (32)#	40.6
Louisiana	CB	14.8	0.57 (136)#		
Maine	RW	14.0	-1.05 (-99)*		
	ST	42.7	-3.56 (-99)*		
Manitoba	GR	4.0	0.54 (-94)*	2.3 (10)#	143.8
	ST	9.0	2.21 (-94)*	8.4 (10)#	420.0
Maryland	GR	145.3	-6.98 (454)*	-43.1 (48)*	-24.1
Michigan	GR	56.8	1.11 (224)#		
	CB	15.5	-0.36 (224)#		
	ST	98.6	4.29 (224)*		
Minnesota	GR	66.3	2.38 (197)#	37.7 (19)*	83.0
	CB	16.6	0.67 (197)*	8.6 (19)#	96.6
	ST	36.0	1.92 (197)*		
Mississippi	GR	68.3	-3.00 (135)*		
	ST	13.5	-0.62 (135)#		
Missouri	RW	87.4	5.81 (166)*	39.9 (16)*	69.2
	CB	22.2	0.62 (166)*		

Table 10. (continued)

Province or State	Species	Mean birds/ route	Slope (1966-76)	Paired route comparison 1974-76 minus 1966-68	
				Difference	Percent change
Montana	RW	18.6	-1.27 (142)*		
	CB	7.0	0.87 (142)*		
Nevada	ST	4.0	0.47 (86)*		
New Brunswick	RW	23.1	1.78 (193)*	15.9 (19)*	78.3
	GR	28.9	-0.93 (193)*		
	CB	12.2	-0.75 (193)*	-4.8 (19)*	-30.8
	ST	53.0	1.17 (193)†		
New Mexico	RW	11.4	1.19 (80)*		
North Carolina	GR	82.8		32.8 (17)†	66.6
	CB	4.8	0.38 (163)*	2.3 (17)†	76.7
North Dakota	GR	26.4	1.58 (182)†	14.4 (20)*†	108.2
Nova Scotia	RW	11.6	0.73 (174)*		
	CB	3.8	0.25 (174)†	3.5 (18)†	102.9
Ohio	RW	250.9	-4.82 (362)†		
	GR	106.2	5.46 (362)*	41.3 (40)*	48.8
	CB	10.0	-0.43 (362)*	-4.0 (40)*	-33.9
Oklahoma	RW	29.7	1.41 (255)*	8.4 (31)†	38.9
	GR	10.3	1.48 (255)*	12.1 (31)*	275.0
Ontario	RW	28.9	1.46 (348)*		
	GR	19.8		9.3 (29)*	49.2
	ST	43.3	-1.59 (348)*		
Oregon	RW	36.0	5.20 (203)*		
	ST	27.1	1.67 (203)†		
Pennsylvania	RW	95.4	-1.54 (563)*		
	GR	99.0	-1.93 (563)†		
	CB	9.6	-0.30 (563)†		
Quebec	RW	21.7	0.85 (162)*		
	CB	7.5	-0.50 (162)*		
	ST	46.3	-3.50 (162)†		
Rhode Island	ST	159.2	15.04 (22)*		
Saskatchewan	RW	87.3	8.60 (99)*		
	CB	17.3	1.54 (99)*		
South Carolina	GR	81.2	29.5 (101)†		
	CB	2.1	0.30 (101)*	2.4 (10)*	600.0
South Dakota	CB	36.0	1.47 (211)*	15.6 (23)†	58.4
	ST	7.5	0.82 (211)†		
Tennessee	RW	28.5	1.40 (397)*	10.5 (42)*	45.9
Texas	RW	51.4		14.3 (51)†	46.3
	GR	5.4	0.66 (626)*	5.6 (51)†	254.5
Virginia	GR	120.2	-16.63 (200)*		
	CB	7.1	-0.49 (200)*		
	ST	68.2	-6.78 (200)*		
Washington	RW	13.3		7.5 (10)†	288.5
	CB	11.9	0.72 (108)*	8.0 (10)*	127.0
	ST	33.9		14.3 (10)*	91.1
West Virginia	GR	55.9	-3.07 (164)†		
Wisconsin	RW	159.4	6.98 (544)*	49.8 (64)*	38.2
	GR	49.4	2.60 (544)*	13.7 (64)†	32.7
	ST	68.4	2.03 (544)†		
Wyoming	CB	1.4	0.21 (74)*		

^aFigures in parentheses are degrees of freedom.^bProbability level $P \leq 0.01 = *; 0.01 < P \leq 0.05 = \#.$ ^cFigures in parentheses are number of paired routes.

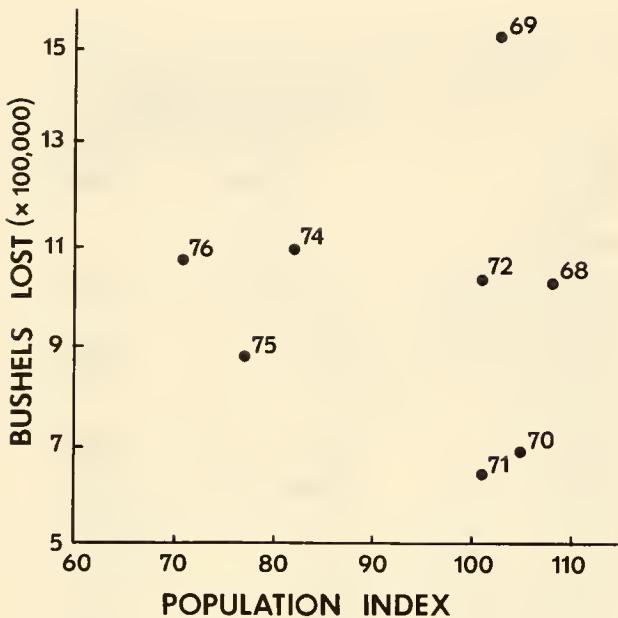


Fig. 19. Relationship between population index of red-winged blackbirds in breeding season and estimated bushels of field corn lost to blackbirds in August-September for Ohio, 1968-76. Population indices are from Appendix 2. Estimates of corn loss are from unpublished data, U.S. Fish and Wildlife Service, Animal Damage Control, Columbus, Ohio. Numbers beside each data point represent years. No estimate of corn loss was made in 1973.

Conclusions

The Breeding Bird Survey is an outstanding cooperative effort of government agencies and private citizens that has provided valuable information on population trends of many bird species across Canada and the United States. Although a survey as extensive and ambitious as this obviously is not without limitations, we believe that for the ubiquitous redwing, grackle, cowbird, and starling it has provided a remarkable overview of the complex pattern of population increase and decrease across North America for 1966-76.

In general, blackbird and starling populations are increasing across much of North America. Combined with the increasing human population and intensification of agriculture, we anticipate increased conflicts between these birds and people in the future.

We would like to caution against simplistic approaches to reducing these conflicts. Many of the population increases are undoubtedly related to land-use changes favorable to the problem species. For example, the recent expansion of corn acreage in southern Quebec is probably a major reason for the increasing redwing population and concurrent damage problems in that area (Martin 1977; Erskine 1978). Also, grackles overwintering in the southern United

States may have enhanced survival rates because of large amounts of waste corn from mechanical harvesting (Dolbeer et al. 1978). Simplistic management approaches to alleviate certain of these conflicts, such as population reduction programs with surfactants on winter roosts (Lefebvre and Seubert 1970), might prove to be large and expensive undertakings providing, at best, only a temporary solution (Dolbeer et al. 1976). The programs might even exacerbate problems by favoring starlings at the expense of native species (Dolbeer et al. 1978). We believe that information on population trends of these species, such as presented in this report, combined with studies into the specific causes of the population changes, should improve our ability to develop more effective, long-term solutions to these conflicts than are available at present.

Acknowledgments

D. R. Bystrak and C. S. Robbins of the Migratory Bird and Habitat Research Laboratory, Laurel, Maryland, were very helpful in providing survey data. D. L. Otis provided us with timely statistical advice. M. E. Laderach, P. C. Kleinhenz, K. M. Cote, and B. F. Dotson helped with maps and typing. C. S. Robbins and A. J. Erskine kindly reviewed the manuscript. Finally, appreciation is extended to the many people across North America who participated in the Breeding Bird Survey and made such analyses possible.

References

- Burtt, H. E., and M. L. Giltz. 1977. Seasonal directional patterns of movements and migrations of starlings and blackbirds in North America. *Bird-Banding* 48:259-271.
- Cardinell, H. A., and D. W. Hayne. 1945. Corn injury by redwings in Michigan. *Mich. State Coll., Agric. Exp. Stn. Tech. Bull.* 198. 59 pp.
- Clore, J. 1976. Commercial pest management of birds in grapes. *Proc. Vertebr. Pest Conf.* 7:63-67.
- Cote, K. M., and P. P. Woronecki. 1978. Avitrol® use in Ohio in 1972-1977 to protect field corn from blackbird depredations. *U.S. Fish Wildl. Serv., Denver Wildlife Research Center, Ohio Field Station, Sandusky. Bird Damage Res. Rep.* 70. 11 pp. (Unpubl. rep.)
- Crase, F. T., C. P. Stone, R. W. DeHaven, and D. F. Mott. 1976. Bird damage to grapes in the United States with emphasis on California. *U.S. Fish Wild. Serv., Spec. Sci. Rep.—Wildl.* 197. 18 pp.
- Davis, D. E. 1950. The growth of starling, *Sturnus vulgaris*, populations. *Auk* 67:460-465.
- DeHaven, R. W. 1973. Winter population trends of the starling in California. *Am. Birds* 27:836-838.
- De Vos, A. 1964. Range changes of birds in the Great Lakes Region. *Am. Midl. Nat.* 71:489-502.
- Dolbeer, R. A. 1978. Movement and migration patterns for red-winged blackbirds; a continental overview. *Bird-Banding* 49:17-34.

- Dolbeer, R. A., C. R. Ingram, and J. L. Seubert. 1976. Modeling as a management tool for assessing the impact of blackbird control measures. Proc. Vertebr. Pest Conf. 7:35-45.
- Dolbeer, R. A., P. P. Woronecki, A. R. Stickley, Jr., and S. B. White. 1978. Agricultural impact of a winter population of blackbirds and starlings. Wilson Bull. 90:31-44.
- Dyer, M. I. 1971. Territorial male red-winged blackbird distribution in Wood County, Ohio. Proc. Bird Control Semin. 4:185-194.
- Dyer, M. I., D. B. Siniff, S. G. Curtis, and J. S. Webb. 1973. Distribution of red-winged blackbird (*Agelaius phoeniceus* L.) breeding populations in the Lake Erie region of the United States and Canada. Pages 213-234 in Proceedings of the General Meeting of Working Group on Granivorous Birds, IBP, PT Section, The Hague, Holland.
- Erskine, A. J. 1971. Some new perspectives on the breeding ecology of common grackles. Wilson Bull. 83:352-370.
- Erskine, A. J. 1977. Birds in boreal Canada: Communities, densities, and adaptations. Can. Wildl. Serv. Rep. Ser. 41. 73 pp.
- Erskine, A. J. 1978. The first ten years of the co-operative Breeding Bird Survey in Canada. Can. Wildl. Serv. Rep. Ser. 42. 61 pp.
- Giltz, M. L., and T. M. Stockdale. 1960. The red-winged blackbird story. Ohio Agric. Res. Dev. Cent. Spec. Circ. 95. 19 pp.
- Godfrey, W. E. 1966. The birds of Canada. Natl. Mus. Can. Bull. 203. 428 pp.
- Graber, R. R., and J. W. Graber. 1963. A comparative study of bird populations in Illinois, 1906-1909 and 1956-1958. Ill. Nat. Hist. Surv. Bull. 28:383-528.
- Graham, F., Jr. 1978. Problem birds: Blockbuster weapon on way. Audubon 80:99-101.
- Kessel, B. 1953. Distribution and migration of starlings in North America. Condor 55:49-67.
- Lefebvre, P. W., and J. L. Seubert. 1970. Surfactants as blackbird stressing agents. Proc. Vertebr. Pest Conf. 4:156-161.
- Lefebvre, P. W., J. S. Webb, B. Meanley, A. E. Hester, P. L. O'Halloran, C. P. Stone, and D. W. Smith. 1976. Breeding redwing populations of the Arkansas Grand Prairie (1962-1969). U.S. Fish Wildl. Serv., Denver Wildlife Research Center, Gainesville Field Station, Work Unit P-F-23.4. 5 pp. (Unpubl. rep.)
- Martin, M. L. 1977. Flocking and roosting activities of the red-winged blackbird in southern Quebec. M. S. Thesis. McGill Univ., Montreal, Quebec. 102 pp.
- McAtee, W. L. 1926. Blackbird roosts. Auk 43:373-374.
- Meanley, B. 1965. The roosting behavior of the red-winged blackbird in the southern United States. Wilson Bull. 77: 217-228.
- Meanley, B. 1971. Blackbirds and the southern rice crop. U.S. Dep. Inter., Bur. Sport Fish. Wildl., Resour. Publ. 100. 64 pp.
- Meanley, B. 1975. The blackbird-starling roost problem. Atl. Nat. 30:107-110.
- Meanley, B. 1976. Distribution and migration of the common grackle (movements between States and Provinces). U.S. Fish Wildl. Serv., Denver Wildlife Research Center, Laurel, Md. Spec. Rep., Work Unit P-F-24.3. 54 pp. (Unpubl. rep.)
- Meanley, B., and W. C. Royall, Jr. 1976. Nationwide estimates of blackbirds and starlings. Proc. Bird Control Semin. 7:39-40.
- Meanley, B., and J. S. Webb. 1965. Nationwide population estimates of blackbirds and starlings. Atl. Nat. 20:189-191.
- Monroe, B. L., Jr., and L. S. Cronholm. 1977. Blackbird study. Final Report, Kentucky Environmental Quality Commission, Univ. Louisville, Louisville, Ky. 61 pp.
- Mott, D. F., and C. P. Stone. 1973. Bird damage to blueberries in the United States. U.S. Dep. Inter., Bur. Sport Fish. Wildl., Spec. Sci. Rep.—Wildl. 172. 15 pp.
- Oberholser, H. C. 1974. The bird life of Texas. Vol. 2. Univ. Texas Press, Austin. Pages 521-1069.
- Potvin, N., J. M. Bergeron, and C. Fernet. 1976. Regime alimentaire d'oiseaux frequentant un agrosystème. Can. J. Zool. 54:1992-2000.
- Robbins, C. S., and A. J. Erskine. 1975. Population trends in nongame birds in North America. Trans. N. Am. Wildl. Nat. Resour. Conf. 40:288-293.
- Robbins, C. S., and W. T. Van Velzen. 1967. The Breeding Bird Survey, 1966. U.S. Dep. Inter., Bur. Sport Fish. Wildl., Spec. Sci. Rep.—Wildlife 102. 43 pp.
- Robbins, C. S., and W. T. Van Velzen. 1969. The Breeding Bird Survey, 1967 and 1968. U.S. Dep. Inter., Bur. Sport Fish. Wildl., Spec. Sci. Rep.—Wildlife 124. 107 pp.
- Royall, C. W., Jr. 1977. Starling band recoveries related to Kentucky and Tennessee. U.S. Fish Wildl. Serv., Denver Wildlife Research Center, Bird Damage Research Report 35. 13 pp. (Unpubl. rep.)
- Stickley, A. R., Jr., D. T. Palmer, and D. L. Otis. 1978. Evaluation and results of a blackbird and mammal damage survey to mature field corn over a large (three-state) area. Proc. Am. Soc. Test. Mater. 2: In press.
- Stone, C. P. 1973. Bird damage to tart cherries in Michigan, 1972. Proc. Bird Control Semin. 6:19-23.
- Stone, C. P., D. F. Mott, J. F. Besser, and J. W. De Grazio. 1972. Bird damage to corn in the United States in 1970. Wilson Bull. 84:101-105.
- Virgo, B. B. 1971. Bird damage to sweet cherries in the Niagara Peninsula, Ontario. Can. J. Plant Sci. 51:415-423.
- Walkinshaw, L. H., and W. R. Faust. 1974. Some aspects of Kirtland's warbler breeding biology. Jack-Pine Warbler 52:65-75.
- Weber, W. C., and J. B. Theberge. 1977. Breeding Bird Survey counts as related to habitat and date. Wilson Bull. 89:543-561.

Appendix 1

An analysis of Breeding Bird Survey data for redwings in one substratum is included to clarify the actual calculations performed and to illustrate some of the problems involved in the analysis of Breeding Bird Survey data. The substratum chosen, west-central Ohio (Stratum 31), is not entirely representative in that the number of survey routes and their coverage is better than average. Also, the mean number of redwings recorded per route is among the highest for any substratum. The actual data, total redwings recorded each year on the 15 routes, are tabulated in Table A-1. The calculated population index and summary statistics for this substratum can be found in Appendix 2 (Ohio, Stratum 31).

The assumption was made that the bird populations within the same geographic area, the substratum, are in fact related to each other as they are likely influenced by common environmental, agricultural, or land-use factors. Thus when survey results from all routes of the substratum were combined, if a pattern emerged as statistically significant, it served as a valid index to change in the entire population in that area. We therefore assumed simple random sampling rather than stratified random sampling within each of the substrata considered. Each substratum was then in turn considered as a unit in a stratified sample of a larger geographic area in order to examine stratum or State changes. The substratum statistics were appropriately weighted by the proportion of the total land area in each substratum. This method of analysis departed from a stratified random sample within substrata as used by Erskine (1978) and Robbins and Erskine (1975) in that individual routes were not weighted according to the portion or number of degree blocks of longitude and latitude (from 0.5 to 2.5) each route represents. This slightly different approach contributes to differences in the exact numbers we report and the outcome of other analyses done with the same

Breeding Bird Survey data.

The method for calculation of the yearly population index values, 1966-76, was based on the percentage change in the mean number of birds recorded for all routes in the substratum run in consecutive years. The percentage change was cumulated forward or backward from year 1971 which was assigned an index of 100. For example, consider the change in the redwings indexed in Ohio, Stratum 31, from 1973 to 1974. The mean number of birds on those routes run both years changed from 394.6 to 294.6, a difference of -100.0. The percentage change was $-100/394.6 = -25.3\%$. The index value in 1973 was 98.2; thus in 1974 it would become $98.2 + (98.2 \times -0.253) = 73.3$. We tested the mean difference for the eight paired observations to see if it differed significantly from zero using

$$t = \frac{\bar{d}}{s_d} = \frac{-100.0}{54.4} = 1.84, \text{n.s.}$$

Additional statistical analysis was based on a regression model to examine any linear trend in the number of birds observed from 1966 through 1976. The variation in the mean number of birds recorded on different survey routes within a substratum was not considered relevant for the determination of change in numbers with time. A change over 10 years from 500 to 400 birds recorded on a route was equivalent for an index to a change from 200 to 100 birds over the same period. Therefore, in the regression model each route was allowed to have its own mean value or intercept. The reduction in sum of squares due to the best single slope (common slope) was tested against the remaining variation. The resulting regression analysis and the test to determine if the slope was significantly different from zero for Substratum 31 in Ohio are shown in Table A-2.

Table A-1. Number of red-winged blackbirds recorded for each route in Substratum 31 in Ohio, 1966-76. Summary statistics are presented in Appendix 2.

Route no.	Number of redwings recorded per year												Mean birds/ route
	66	67	68	69	70	71	72	73	74	75	76		
12	181	230	-	40	84	127	-	106	85	97	113	118.1	
13	203	198	184	363	124	479	561	292	-	-	292	299.6	
26	590	385	-	-	-	-	-	-	-	-	-	487.5	
27	307	-	-	303	-	-	210	183	281	-	196	246.7	
32	138	222	94	-	-	-	365	353	173	187	170	212.8	
33	85	169	197	240	223	148	149	196	136	150	152	167.7	
34	463	288	289	271	206	252	166	200	-	-	175	256.7	
35	730	-	401	318	289	345	299	265	-	-	-	378.1	
41	223	215	189	139	194	120	138	-	-	-	97	164.4	
42	634	559	625	612	729	673	587	763	621	502	487	617.4	
60	303	327	324	380	413	421	602	405	225	314	255	360.8	
65	498	0	924	903	940	698	855	1010	632	488	551	681.7	
66	343	347	274	204	368	199	207	119	-	237	206	250.4	
67	414	215	499	450	289	247	176	141	204	-	-	292.8	
68	299	403	224	-	-	217	-	215	-	-	-	271.6	
Means for	336.5-273.7	390.6-388.0		350.8-337.2	379.7-357.0		312.0-289.7					320.4	
paired routes:	267.5-347.5	356.4-350.8		358.2-374.0	394.6-294.6		282.1-276.2						
Percent change:	+22.9	-23.0	+0.7	+1.6	+4.0		+4.4	-6.0	-25.3	-7.1	-2.1		

Table A-2. Linear regression analysis of Breeding Bird Survey data to test the hypothesis that the annual rate of change in birds/route (slope) is not significantly different from zero for red-winged blackbirds in Substratum 31, Ohio, 1966-76. Regression model allows each route within substratum to have separate intercept but only a common slope.

Source of variation	df	Sums of squares	Mean squares	F-value
15 means	15	16,760,503.0		
Single slope	1	49,324.2	49,324.2	3.069
Residual	110	1,768,158.9	16,074.2	
Total	126	18,577,986.1		

$$\text{Error mean square} = \hat{s}_{y.x}^2 = 16,074.2$$

$$\hat{b} = \text{single slope} = -6.2799$$

$$\underline{t} = (\hat{b} - 0) / \hat{s}_b = b / \sqrt{\hat{s}_{y.x}^2 / \sum x^2} = -6.2799 / \sqrt{16074.2 / 1250.7}$$

$$\underline{t} = -1.75, \text{ df} = 110, \underline{P} < 0.10$$

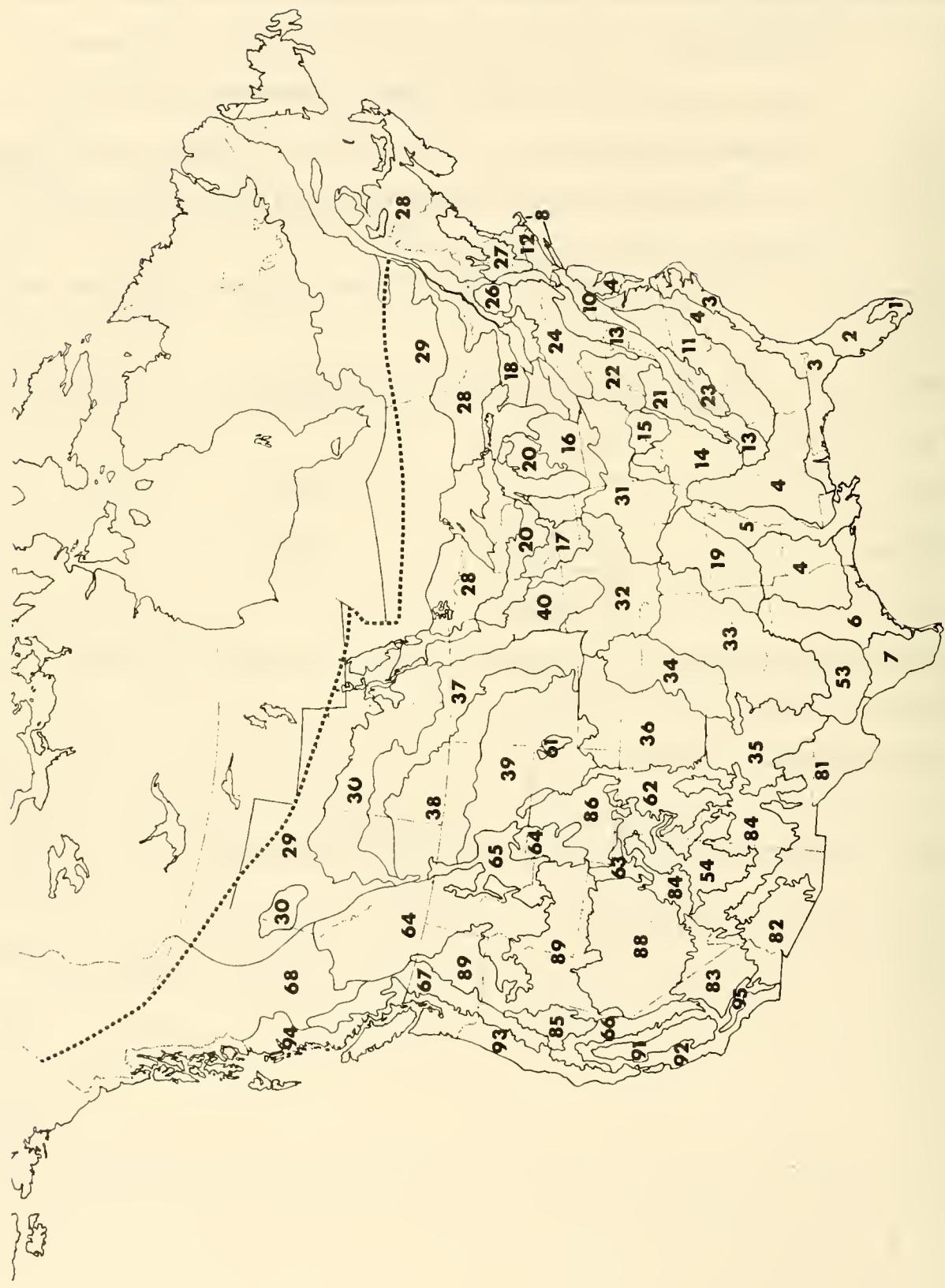


Fig. A.1. Location of the ecological substrata used in the analysis of Breeding Bird Survey Data. Dashed line indicates northern limit of coverage by the Survey.

Appendix 2

Population trends of red-winged blackbirds (RW), common grackles (GR), brown-headed cowbirds (CB), and starlings (ST), 1966-76 for the United States and Canadian Provinces and their respective substrata. (Probability level $P \leq 0.01 = *$; $0.01 < P \leq 0.05 = #$; $0.05 < P \leq 0.10 = +$.)

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum		Annual population index												1966-76				minus 1966-68)		
Mean birds/ route	Num rtes	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a	
Alabama all strata	RW	43	44.4	68	70	124	97	107	100	103	103*	75#	93	101	345	1.05	38	10.4	4.4	
	GR	49.8	69	83	114	86	103	100	106	102	103	104	90	0.13	#	1.6	0.8	-14.1	-3.5	
	CB	7.9	141	166	132	101	117	100#	189	144	130	135	189	0.25	#	18.3	1.3	-14.1	-3.7	
	ST	29.4	119	116	100	126	115	100	91	93+	77	71	73	-0.41	+	176.2				
Stratum 3 wt = 0.07 a = 9702	RW	5	56.2	62	93	90	86	86	100	74	72	45	52	171	40	-0.82	5	19.2	9.7	
	GR	47.4	106	92	75	76	85	100	84	78	81	146	76	0.22		30.4	14.9			
	CB	1.6	82	68	204	82	36	100+	12	12	84	126	42	-0.08		10.0	0.2			
	ST	3.6	109+	47	78	218*	127	100	218	154	322	283	77	0.37						
Stratum 4 wt = 0.55 a = 71466	RW	20	40.5	67	52#	67	86	110	100	96	103+	76	85	87	165	2.85	*	19	82.0	19.1
	GR	41.8	66	73+	89	79	109	100	122	112+	139	125	106	0.24				-3.1	-1.2	
	CB	8.2	167	138	118	76	97	100	187	123	144	113+206	0.46	*			30.8	2.1		
	ST	15.7	106	83	86	99	104	100	77	96	84	82	89	-0.37	#	-16.7	-2.9			
Stratum 11 wt = 0.08 a = 10728	RW	2	21.6	-	-	-	-	-	-	-	-	-	-	13	5.43	*	1	-	49.0	
	GR	28.7	-	-	-	-	-	-	-	-	-	-	-		7.78	*	-	-	68.3	
	CB	6.0	-	-	-	-	-	-	-	-	-	-	-		0.75		-	-	10.7	
	ST	20.3	-	-	-	-	-	-	-	-	-	-	-		1.50		-	-	3.7	
Stratum 13 wt = 0.23 a = 29622	RW	11	39.5	94	97	108	90	115	100	93	104	71	102	84	93	-1.50	+	9	-31.3	-16.9
	GR	50.9	73	79	86	104	105	100	101	96	106	85#	88	1.12				30.4	11.9	
	CB	8.9	161	117	150	128	169	100	146	134	106	94	137	0.00				-5.8	-0.5	
	ST	68.4	104	108	105	152	136	100	98	86+	67	61	60	-0.70				-19.4	-7.9	
Stratum 14 wt = 0.07 a = 8883	RW	5	106.4	51	69	336	115	99	100	157	83	77	89	102	34	-8.36		4	-54.6	-102.7
	GR	138.4	63	131	268	100	105	100	109+	75	83	76	76	0.53				-49.3	-116.3	
	CB	12.0	999	999	686	999#	150	100	395	250	145	406	181	0.08				-48.1	-9.9	
	ST	48.5	210	251	172	153	132	100	147	117	98	130	101	-1.23				-20.4	-11.0	

State/ Stratum	Sp	Num rtts	Mean birds/ route	Annual population index										Paired route comparison (1974-76 minus 1966-68)									
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a		
Alberta all strata	RW	44	26.8	337	337	337	337	337	337	134	100	118	133	132#175	152	132	0.81	+	4	-48.7	-29.0	*	
	GR	1.2	-	-	70	70	70	70	70	100	190	62	80	152	142	0.09	-	-	0.1	0.1	0		
	CB	8.3	-	-	93	98	124	100	74	104	116	111	120	0.57	-	62.3	-	7.1	*	-10.5	-10.1		
	ST	16.6	-	-	272	156	116	100	112	143	99+	71#162	-0.51	-	-40.5	-	-	-	0	0	0		
Stratum 29 wt = 0.48 a = 247842	RW	5	4.2	-	-	-	-	-	-	100	-	-	114	171	-	2	-	-	0	0	0		
	GR	0.0	-	-	-	-	-	-	-	0	-	-	0	0	-	-	-	-	0	0	0		
	CB	3.4	-	-	-	-	-	-	-	100	-	-	171	200	-	-	-	-	0	0	0		
	ST	1.5	-	-	-	-	-	-	-	100	-	-	75	0	-	-	-	-	0	0	0		
Stratum 30 wt = 0.25 a = 13087	RW	20	51.0	-	-	189	197	157	100	111	118	120	132	127	65	1.39	3	-18.2	-10.3	-	-		
	GR	3.5	-	-	0	0	0	0	100	86	25	20	27	40	0.31	-	-	0.3	0.3	0.3	0.3		
	CB	10.9	-	-	123	152	114	100	80	106	143	98	103	-0.31	-	14.4	-	2.6	-	-			
	ST	34.4	-	-	291	173	100	100	100	197	102+	63#183	-2.02	-	-39.6	-	-37.2	-	-	-	-		
Stratum 37 wt = 0.06 a = 33631	RW	4	65.0	-	-	85	136	100	100	151	155	206	136	16	7.88	*	0	0	0	0	0		
	GR	2.7	-	-	-	67	67	100	217	101	404	999	809	0.36	*	*	*	*	0	0	0		
	CB	11.5	-	-	-	53	84	100	93	121	204	210	199	1.85	-	-	-	0	0	0			
	ST	38.9	-	-	-	40	207	100	153	69	38	42	84	1.34	-	-	-	-	-	-	-		
Stratum 38 wt = 0.13 a = 66488	RW	10	58.3	-	-	432	180	110	100	133	141	126	238	209	41	-7.26	*	1	-	-204.5	-	-	
	GR	1.4	-	-	37	37	37	100	497	128	96	288	0	-0.04	-	-	-	0	0	0			
	CB	21.7	-	-	91	84	145	100	69	102	80	88	95	-1.51	-	50.0	-	50.0	-	-7.5	-		
	ST	32.5	-	-	196	56	112	100	140	114	218	174	258	-6.07	-	-	-	-	-	-	-		
Stratum 64 wt = 0.07 a = 36219	RW	5	1.5	-	-	-	-	-	-	100	-	-	160	180	160	8	0	0	0	0	0		
	GR	0.2	-	-	-	-	-	-	-	100	-	-	999	0	0	-	-	0	0	0	0		
	CB	4.9	-	-	-	-	-	-	-	100	-	-	32	45	87	-	-	-	-	-	-		
	ST	6.4	-	-	-	-	-	-	-	100	-	-	37	85	58	-	-	-	-	-	-		

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Arizona all strata	RW	27	38.9	-	-	999*699#550	100	139	74	147	115	113	99	-22.90	*	11	-77.1	-205.5			
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0.00	0.0	#	0.0	0	0	0	0	
	CB	6.2	-	-	395*248#	85	100	86	105	104#	53#102	102	-0.65	#	-37.5	-6.3					
	ST	3.3	-	-	1*	3	31	100	197	132	109	249	116	0.19	190.0	5.7					
Stratum 54 wt = 0.18 a = 53038	RW	2	0.8	-	-	-	-	-	-	-	-	-	10	0.29	+	2	0.0	2.3			
	GR	0.0	-	-	-	-	-	-	-	-	-	-	0.00	0.0		0.0	0	0	0	0	
	CB	4.4	-	-	-	-	-	-	-	-	-	-	1.17	480.0	12.0						
	ST	4.5	-	-	-	-	-	-	-	-	-	-	1.98	-	22.5						
Stratum 81 wt = 0.23 a = 6659	RW	8	2.9	-	-	87	750	800	100	100	88	0	0	30	-0.97	#	3	82.4	4.1		
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0.00	0.0		0.0	0	0	0	0	
	CB	11.7	-	-	180	254	84	100	56	39	38	22	53	-0.73	7.5	1.4					
	ST	2.0	-	-	0	0	98	100	343	49	114	999	999	0.33	-	1.9					
Stratum 82 wt = 0.28 a = 82766	RW	8	134.6	-	-	999	999	505	100	138	74	154	119	119	29	-80.47	*	3	-77.8	-732.3	
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.0		0.0	0	0	0	
	CB	5.3	-	-	576	188	0	100	55	160	80	140	153	-0.50	-75.8	-24.8					
	ST	6.5	-	-	5	15	15	100	144	150	112	262	73	-0.74	72.3	6.0					
Stratum 83 wt = 0.04 a = 12036	RW	1	0.0	-	-	-	-	-	-	-	-	-	-	1		0	0	0	0	0	
	GR	0.0	-	-	-	-	-	-	-	-	-	-	-								
	CB	0.3	-	-	-	-	-	-	-	-	-	-	-								
	ST	0.0	-	-	-	-	-	-	-	-	-	-	-								
Stratum 84 wt = 0.27 a = 79316	RW	8	0.7	-	-	206	180	206	100	100	92	92	55	55	29	-0.13	+	3	-48.2	-1.3	
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0	0.00	0.0		0.0	0	0	
	CB	4.6	-	-	429	220	350#100	400	325	999+250	0	0	0	0	-0.52	-38.7	-6.5				
	ST	0.7	-	-	50	29	100	100	100	46	46	0	0	-0.11	-78.3	-1.8					

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Linear trend 1966-76					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	F ^a	% chg	abs chg	P ^a	
Arkansas all strata	RW	29	93.9	-	47	85	92	82	100	109	118	104	104#126	223	4.49	*	26	55.2	34.7	#	
	GR	35.9	-	125	118	132	147+100	134	176	172	142	163	-	1.86	*	52.5	15.8	15.8	#		
	CB	15.0	-	161	134	164	171+100	202	223	281	265	172	0.74	+	30.7	4.3	30.7	4.3			
	ST	22.4	-	87	77#	61#	97	100	86	84#106#	77	84	-0.03	-	16.2	3.2	16.2	3.2			
Stratum 4 wt = 0.24 a = 32722	RW	8	18.9	-	64	98	104	89	100	104	173	82	72	86	68	0.47	8	17.1	2.6		
	GR	20.0	-	60	90	73	89	100	94	103	102	84	55	-	0.23	17.0	2.9	17.0	2.9		
	CB	14.9	-	154	102	140	144	100	119#184	180	115	152	-	0.31	-	27.9	3.6	27.9	3.6		
	ST	7.8	-	240	157	141	143	100	47	90	169	87	120	-0.86	#	-41.8	-5.1	-41.8	-5.1		
Stratum 5 wt = 0.29 a = 39166	RW	8	273.7	-	46	87	93	83	100	115	120	106	107	136	61	14.09	*	7	58.8	105.7	+
	GR	76.9	-	165	143	168	181	100	124	191	190	148	194	-	2.00	-	27.0	20.6	27.0	20.6	
	CB	23.2	-	326+142+352	260	100	344	327	540	618	246	-	2.03	-	100.0	16.4	100.0	16.4			
	ST	29.6	-	81	90	72	132	100	151	117	137	124	93	-0.38	-	33.3	8.0	33.3	8.0		
Stratum 19 wt = 0.47 a = 62650	RW	13	20.6	-	44	63	79	70	100	73	92	116	122	101	94	0.65	11	48.3	7.1		
	GR	18.6	-	80	69	91	107	100	188	192	172	162	174	-	2.62	*	245.0	19.6	245.0	19.6	
	CB	9.9	-	100	159	97	131	100+169	184	189	158	134	-	0.16	-	-21.4	-2.8	-21.4	-2.8		
	ST	25.5	-	82	68#	52	79	100	62	71	91+	57	76	-0.13	-	21.2	4.5	21.2	4.5		
RW GR CB ST																					

Paired route
 comparison (1974-76
 minus 1966-68)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index										Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	r ^a	n	% chg	abs chg	p ^a		
British	RW	79	5.8	-	-	64	#76	104	100	50	102	74	133	#91	148	0.16	7	-24.5	-1.2				
Columbia	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0		0.00	0	0	0				
all strata	CB	6.2	-	-	45	+70	55	100	32	41	#76	69	72			0.71	*	-21.0	-0.8				
	ST	31.9	-	-	36	#154	72	100	117	359	208	188	178			4.69	*	85.7	13.8				
Stratum 29	RW	3	3.6	-	-	-	-	-	100	-	-	-	100	75	2		0	0	0	0			
wt = 0.20	GR	0.0	-	-	-	-	-	-	0	-	-	-	0	0			0	0	0	0			
a = 174864	CB	6.1	-	-	-	-	-	-	100	-	-	-	400	500									
	ST	8.6	-	-	-	-	-	-	100	-	-	-	125	50									
Stratum 30	RW	2	15.2	-	-	-	-	-	-	-	-	-	-	-	1		0	0	0	0			
wt = 0.01	GR	0.0	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	0			
a = 6700	CB	7.8	-	-	-	-	-	-	-	-	-	-	-	-									
	ST	17.5	-	-	-	-	-	-	-	-	-	-	-	-									
Stratum 64	RW	34	10.4	-	-	159	169	109	100	177	75	91	145	88	71	0.64	2	-39.4	-6.7	*			
wt = 0.20	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0		0.00	0	0	0				
a = 182722	CB	10.1	-	-	86	104	74	100	63	34	32	38	43			-0.01	-64.7	-5.5					
	ST	31.7	-	-	165	418	46	100	589	892	+9999	9999	#730	1.54				48.4	17.2				
Stratum 67	RW	3	3.9	-	-	-	-	100	100	-	-	100	380	220	4		0	0	0	0			
wt = 0.04	GR	0.0	-	-	-	-	-	0	0	-	-	0	0	0			0	0	0	0			
a = 38314	CB	0.2	-	-	-	-	-	100	100	-	-	0	0	448									
	ST	44.7	-	-	-	-	-	50	100	-	-	0	0	0									
Stratum 68	RW	19	4.5	-	-	35	59	+170	+100	-	400	192	428	332	24	-0.11	2	-50.0	-0.5				
wt = 0.39	GR	0.0	-	-	0	0	0	0	-	0	0	0	0	0		0.00	0	0	0				
a = 352230	CB	2.5	-	-	4	19	12	100	-	650	999	999	867			0.13	150.0	1.5					
	ST	20.8	-	-	6	338	121	100	-	133	61	29	46					314.0	15.7				

State/ Stratum	Sp	Mean birds/ route	Annual population index										Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)			
			66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a
Stratum 9 ₄	RW	18	6.2	-	-	0	67	64	100	7	28	16	24	16	46	-0.90	3	40.3	2.7	
wt = 0.16	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.0	0.0	0	
a = 138246	CB	12.0	-	-	83	56	56	100	0	88	117	105	107	107	0.10	0.10	-13.1	-1.4		
	ST	87.1	-	-	6	69	61	100	0	71	67	127	105	105	7.16	+	47.6	26.3		

RW
GR
CB
ST

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index										Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a		
California all strata	RW	176	84.3	-	-	188	122+	78+100	101	145	153	118	112	667	8.10	*	22	27.9	8.3				
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.0	0	0.0	0	0			
	CB	4.0	-	-	-	43	80	84	100	121	134	91	95	154	0.39	+	107.7	1.4	+				
	ST	30.1	-	-	-	76#213	109	100	134+206	181	169	149	2.19	*	191.2	30.6	+						
Stratum 66 wt = 0.16 a = 63357	RW	23	3.4	-	-	0	266	25	100	25	28	37	33	26	76	0.09	2	-	4.8				
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.0	0	0.0	0	0			
	CB	3.7	-	-	-	86	186	43	100	227	287	294	206	227	0.02	-33.3	-1.0						
	ST	4.6	-	-	-	35	265	69	100	69	94	129	107	142	0.01	486.7	7.3						
Stratum 82 wt = 0.07 a = 26747	RW	11	641.6	-	-	100	100	100	100	134	183#249	162	139	32	92.12	*	2	-	8.2				
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.0	0	0.3	0.3				
	CB	5.3	-	-	-	100	100	100	100	100	6	0	0	-0.01	-0.01	-	-	0.3					
	ST	31.0	-	-	-	0	0	3	100	239	218	257	210	173	5.96	*							
Stratum 83 wt = 0.18 a = 73222	RW	17	3.7	-	-	60	60	60	100	120	80	40	60	22	43	0.43	*	2	0.0	0			
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.0	0	0	0	0			
	CB	0.5	-	-	-	14	14	14	100	86	57	86	86*	343	0.14	#	-	1.5					
	ST	4.2	-	-	-	57	164	29	100	43	82	65	157	107	0.64	+	405.0	16.2	+				
Stratum 85 wt = 0.06 a = 2537	RW	10	74.2	-	-	-	-	-	54	100	32	51	45	58	56	37	5.09	0	0	0			
	GR	0.0	-	-	-	-	-	-	0	0	0	0	0	0	0.00	0.00	0	0	0	0			
	CB	7.6	-	-	-	-	-	-	400	100	775	431	418	229	999	3.11							
	ST	33.7	-	-	-	-	-	-	74	100	87	66	56	67	82	4.84	#						
Stratum 88 wt = 0.02 a = 9555	RW	5	6.3	-	-	32	0	63	100	16	16	22	4	14	17	0.39	1	1.3					
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0			
	CB	1.1	-	-	-	100	100	100	100	100	100	100	175	75	0.20	+	0.20	0.09	0.09	1.0			
	ST	0.4	-	-	-	100	100	100	100	100	100	100	100	0	266								

State/ Stratum	Sp	Annual population index												Paired route comparison (1974-76 minus 1966-68)					
		Linear trend 1966-76												% abs chg	P ^a				
Mean birds/ route	Num rts	66	67	68	69	70	71	72	73	74	75	76	df	slope	F ^a	n	% abs chg	P ^a	
Stratum 89	RW	3	154.1	-	-	-	-	-	-	-	-	-	7	0	0	0	0	0	
wt = 0.02	GR	0.0	-	-	-	-	-	-	-	-	-	-	0	0.0	0.0	0	0	0	
a = 7910	CB	5.2	-	-	-	-	-	-	-	-	-	-	0	0.39	762.5	6.1	284.4	92.7	
	ST	31.6	-	-	-	-	-	-	-	-	-	-	43	0.42	121.4	#	48.7		
Stratum 91	RW	24	162.7	-	-	-	-	-	-	-	-	-	7	5	18.0	20.5	0	0	
wt = 0.14	GR	0.0	-	-	-	-	-	-	-	-	-	-	0	0.0	0.0	0	0	0	
a = 58904	CB	6.7	-	-	-	-	-	-	-	-	-	-	0	0.39	166.7	1.0			
	ST	52.9	-	-	-	-	-	-	-	-	-	-	114	4.42	121.4	#	48.7		
Stratum 92	RW	53	30.4	-	-	-	-	-	-	-	-	-	70	0.02	7	31.7	15.8		
wt = 0.26	GR	0.0	-	-	-	-	-	-	-	-	-	-	0	0.0	0.0	0	0	0	
a = 103919	CB	4.2	-	-	-	-	-	-	-	-	-	-	0	0.50	*				
	ST	58.2	-	-	-	-	-	-	-	-	-	-	173	2.27					
Stratum 93	RW	20	16.8	-	-	-	-	-	-	-	-	-	70	0.02	7	31.7	15.8		
wt = 0.08	GR	0.0	-	-	-	-	-	-	-	-	-	-	0	0.0	0.0	0	0	0	
a = 33390	CB	3.8	-	-	-	-	-	-	-	-	-	-	0	0.39	23.9	1.6			
	ST	13.8	-	-	-	-	-	-	-	-	-	-	173	1.39	#	-	6.1		
Stratum 95	RW	10	2.0	-	-	-	-	-	-	-	-	-	70	1.95	3	-6.6	-0.5		
wt = 0.01	GR	0.0	-	-	-	-	-	-	-	-	-	-	0	0.00	0.0	0	0	0	
a = 2590	CB	5.5	-	-	-	-	-	-	-	-	-	-	0	0.32	128.1	1.6			
	ST	4.2	-	-	-	-	-	-	-	-	-	-	45	-0.16					
	RW														0	0	0		
	GR															0	0		
	CB															0	0		
	ST																		

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Annual population index												1966-76							
		Mean birds/ route	Num rts	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Colorado all strata	RW	23	40.9	-	-	54*	67	78	100	86	88	110	117	102	120	1.98	#	9	56.2	22.1	#
	GR	1.9	-	-	-	64	182	177	100	104	96	116	62	115	-0.04	-	40.0	0.4	516.7	3.1	#
	CB	2.0	-	-	-	7*101	45	100	37	53	97	99+	69	-0.32	*	103.1	6.6	*			
	ST	12.3	-	-	-	92	151	160	100	182	223	192	158	141	0.80						
Stratum 36 wt = 0.43 a = 116480	RW	10	27.7	-	-	65	86	106	100	81	86	104+	64	63	56	0.81	6	65.3	9.8		
	GR	3.1	-	-	-	64	182	177	100	104	86	139	75	108	-0.34	-	43.5	1.0			
	CB	1.0	-	-	-	39	117	0	100	17	8	100	75	42	0.13	+	92.3	1.2			
	ST	7.0	-	-	-	56	144	124	100	86	81	71	102	72	0.85	+	24.1	1.4			
Stratum 62 wt = 0.38 a = 103056	RW	6	24.2	-	-	63	59	53	100	54	71	74	108	84	29	-0.96	2	31.0	13.8		
	GR	1.5	-	-	-	100	100	100	100	22	18	9	32	-0.28	*	0.0	0	0	0		
	CB	1.9	-	-	-	0	133	100	100	33	100	77	105	98	0.25	+	-	0	1.5		
	ST	12.8	-	-	-	100	167	400	100	333	999	796	999	835	1.67	#	180.0	2.7			
Stratum 84 wt = 0.16 a = 42813	RW	6	122.5	-	-	43	65	93	100	127	115	160	191	166	34	11.64	*	1	79.0	0	
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0	
	CB	4.4	-	-	-	0	33	33	100	70	110	330	400	#252	1.33	*	1.33	12.3			
	ST	26.1	-	-	-	0	287	100	497	440	679	229	317	-	3.47	+	3.47	31.3			
Stratum 86 wt = 0.02 a = 6408	RW	1	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0	0	
	GR	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	
	CB	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	
	ST	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index								Linear trend 1966-76								Paired route comparison (1974-76 minus 1966-68)							
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	% abs chg	P ^a	n	% chg	% abs chg			
Connecticut	RW	16	56.3	78	82	112	106	140	100	68	56	59	54	52	82	-3.58	*	7	-45.0	-34.2	"						
Stratum 12	GR	33.5	53	60	71	#112	87	100	68	68	57	63	48			-1.69	#		-35.8	-12.9							
wt = 1.00	CB	7.6	81	129	141	124	111	100	87	125	87	109	104			-0.52	*		-50.8	-6.1							
a = 12593	ST	63.7	116	90	107	105	88	100	63	67	70	77	67			-1.10			-24.6	-17.6							
	RW																										
	GR																										
	CB																										
	ST																										
	RW																										
	GR																										
	CB																										
	ST																										
	RW																										
	GR																										
	CB																										
	ST																										

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)					
				Linear trend 1966-76																	
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Delaware	RW	10	63.1	69#129	118+	85	99	100	111	110	159	123	116	88	2.04		9	53.1	27.9		
Stratum 4	GR		166.6	89	115	100	133	120	100	112	101	101	132	84		-2.71		4.2	5.9		
wt = 1.00	CB		3.8	87	65	39#	97	60	100	85	98#	35	81	78		0.06		2.8	0.1		
$\alpha = 51.33$	ST		117.6	63#111	115	106	87	100	112	96	79	99	82		-0.24		4.4	4.5			
	RW																				
	GR																				
	CB																				
	ST																				
	RW																				
	GR																				
	CB																				
	ST																				
	RW																				
	GR																				
	CB																				
	ST																				

RW GR CB ST

Paired route
comparison (1994-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route										df	slope	P ^a	% chg	abs chg	P ^a		
		Num rnts	66	67	68	69	70	71	72	73	74								
Florida all strata	RW	39	56.1	113	99	98	76	84	100	109	98	83	70	55	287	0.67	34 -18.1	-9.5	
	GR	33.6	105	85	83	109	119	100	92	100	109#	89	94	#		0.99	18.6	6.3	
	CB	0.7	118	118	68	50#	103	100	91	67	112	113	101	0.05		0.05	40.0	0.2	
	ST	6.1	67	58	129	45	134	100	120	143	202#	150	167	0.47	*		69.2	2.7	
Stratum 1 wt = 0.14 a = 19029	RW	5	122.6	70#	93	94	95	84	100	91	82	79	66	36	27	5.68	#	3 -32.2	-22.6
	GR	53.5	16	13	38	117	112	100	98	111	113	103	109	3.91			26.6	18.0	
	CB	0.0	0	0	0	0	0	0	0	0	0	0	0	0.00		0.0	0.0		
	ST	2.8	18	0	64	18	146	100	56	756	18	0	35	0.42	-	-	0.3		
Stratum 2 wt = 0.44 a = 62152	RW	16	78.1	168	104	106	69	84	100	114	99	83	67	64	115	-0.53	14 -20.3	-17.8	
	GR	41.0	101	96	93	122	123	100	84	92	111	81	78	64		0.53	6.4	2.6	
	CB	0.0	100	100	100	100	100	100	100	100	100	999	0	0		0.00	0.0	0	
	ST	10.6	74	71	139	44	118	100	123	98	137+108	114			0.87	*	76.1	5.4	
Stratum 3 wt = 0.42 a = 58910	RW	18	11.4	68	93	68	95	89	100	108	117	87+129	105	145	0.33		17	35.8	3.4
	GR	19.2	121	79	68	72*	116	100	102	101	100	88	109		0.53		39.8	6.4	
	CB	1.7	118	118	68	50+	103	100	91	67	107	113	101		0.12		45.5	0.5	
	ST	2.5	98	69	122	61	212	100	127	123	173+	90	131		0.06			38.9	

RW GR CB ST RW GR CB ST

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index								Paired route comparison (1974-76 minus 1966-68)						
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	
Georgia all strata	RW	4.9	41.7	121	104	234	113	105	100	87+116	130#169	145	156	0.29	19	-29.4	-17.5	
	GR	47.6	94	72	101	88	94	100	92	99	88#124#100			-0.55	-16.0	-8.1		
	CB	3.7	31	43	46	52	89	100	275	204	190	180	153	0.26	#	63.0	1.7	
	ST	22.0	161	98	99	123	117	100	166	154	132	144	126	-0.41		24.1	3.5	
Stratum 3 wt = 0.13 a = 19477	RW	9	40.7	102	97	535	112	120	100	82	84	83	70	98	29	-10.59	+	2 -58.0 -106.8
	GR	29.2	67	106	248	84	129	100	106	102	93	76	86		-1.11	-64.1	-26.8	
	CB	0.7	0	0	67	100	100	100	100	45	0	0	0		0.09	*	-10.0	-0.2
	ST	9.6	195	49	70	216	43	100	84	57	68	76	158	0.05		15.5	1.5	
Stratum 4 wt = 0.48 a = 72124	RW	18	53.4	167	91	103	142	122	100	96+141	142+189+148		74	2.44	*	8 -26.7	-15.1	
	GR	62.7	95	70	84	88	89	100	87	99	91	105	88	-0.66		-21.2	-15.0	
	CB	3.9	0	64	32	40	68#100	100	280	213	206	230	198	0.49	#	210.0	4.2	#
	ST	20.2	87	111	105	106	132	100	194	222	189	167	151	-0.04		52.2	6.0	
Stratum 11 wt = 0.30 a = 45390	RW	17	31.5	30	32	-	-	25	100	50	-	74	102	72	40	1.13	+	8 32.0 8.6
	GR	35.9	215	150	-	-	225	100	75	-	68+173+123				0.52		39.4	11.3
	CB	3.8	131	38	-	-	100	100	100	-	89	51	61		0.02		-13.1	-0.5
	ST	27.2	46	24	-	-	25	100	25	-	20	28	20		-0.95		-4.6	-1.0
Stratum 13 wt = 0.06 a = 8249	RW	3	17.1	-	-	-	-	51	100	100	87	76	84	111	12	1.00	+	1 16.3
	GR	42.4	-	-	-	-	-	46	100	137	90	34	91	60		-1.09		-15.3
	CB	7.0	-	-	-	-	-	208	100	246	146	138	185	46		-0.77		-4.0
	ST	37.6	-	-	-	-	-	200	100	248	100	117	102	79		-1.66		13.0
Stratum 23 wt = 0.03 a = 5170	RW	2	10.2	-	-	-	-	-	-	-	-	-	-	-		0	0	
	GR	17.2	-	-	-	-	-	-	-	-	-	-	-	-		0	0	
	CB	4.2	-	-	-	-	-	-	-	-	-	-	-	-		0	0	
	ST	24.8	-	-	-	-	-	-	-	-	-	-	-	-				

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)						
				Linear trend 1966-76																		
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a	
Idaho all strata	RW	17	25.1	-	-	56	90	100	100*	51	53+	70*	46	49	48	-1.41		3	6.5	2.6		
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0		0.00		0	0.0	0		
	CB	6.7	-	-	88	84	100	100	244	262	341	220	264	0		0.24		177.8	1.6			
	ST	51.0	-	-	1	2	4	100	112	296	244	466	373	4.07				108.8	16.1	+		
Stratum 64 wt = 0.43 a = 92269	RW	7	17.4	-	-	99	-	-	100	35	42	53	35	29	14	-0.05	+	1	9.7			
	GR	0.0	-	-	0	-	0	-	0	0	0	0	0	0		0.00		0	0	0		
	CB	2.6	-	-	67	-	-	100	0	0	0	0	0	0		0.02			-1.7			
	ST	7.1	-	-	400	-	-	100	28	90	14	470	449	3.37	#				28.0			
Stratum 65 wt = 0.09 a = 19251	RW	3	23.9	-	-	-	-	-	100	76	59	24	24	116	6			0	0	0		
	GR	0.0	-	-	-	-	-	-	0	0	0	0	0	0					0	0		
	CB	3.0	-	-	-	-	-	-	100	250	225	300	300	16					0	0		
	ST	58.2	-	-	-	-	-	-	100	44	77	154	35	44					0	0		
Stratum 89 wt = 0.48 a = 102616	RW	7	32.2	-	-	42	90	100	100	114#100#154	87	166	87	166	28	-3.49	*	2	-16.0	-3.2		
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0		0.00		0	0.0	0		
	CB	11.1	-	-	3	84	100	100	325	310	395	291	291	0		0.78	+		-	4.8		
	ST	89.2	-	-	1	2	4	100+120	318	247	343	215	5.36					42.5	8.5			
RW GR CB ST																						

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index								Paired route comparison (1974-76 minus 1966-68)							
				1966-76				Linear trend 1966-76				df		slope		pa		% chg	abs chg
Illinois all strata	RW	63	198.1	41	76	54	73+116	100	116	116#172	132	132	309	7.95	*	24	31.0	46.9	
	GR	138.9	53	59	65	79	94	100	98	104	112	102	95	-0.94	-	-0.5	-0.5	-0.5	
	CB	10.0	66	70	90	104	131	100	116	137	139+109	122	0.00	19.8	*	19.8	1.7	1.7	
	ST	102.6	79	94+73+	84	95	100	94	98	92	83	96	0.71	11.9	*	11.9	10.0	10.0	
Stratum 14 wt = 0.06 a = 8493	RW	5	93.6	-	-	-	36	124	100	98	99	119#193	166	30	9.33	*	0	0	
	GR	152.2	-	-	-	-	51	239+100	133	119	136	196+106	-20.80	#	-	-	0	0	
	CB	21.1	-	-	-	-	59	139	100	139	171	209	196	144	1.47	+	-	-	
	ST	84.7	-	-	-	-	53	146	100	191#140	134+270#157	-	-	2.13	*	-	0	0	
Stratum 16 wt = 0.06 a = 9132	RW	5	160.4	-	71	83	66	114	100+	93#121	140	115	99	24	11.45	*	3	36.7	44.8
	GR	258.7	-	121	98	112	72	100	80	77	74	77	64	-	2.71	-	-2.0	-4.4	
	CB	10.1	-	86	29	14	86	100	252	189	112	65	215	-	0.68	-	40.0	2.2	
	ST	210.5	-	175	85	99	72	100	88	123	146	104	148	-	17.86	*	40.8	75.9	
Stratum 17 wt = 0.02 a = 3289	RW	1	445.2	-	-	-	-	-	-	-	-	-	-	-	-	2	1	259.0	
	GR	27.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.0	
	CB	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.0	
	ST	47.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.0	
Stratum 31 wt = 0.71 a = 102727	RW	41	205.4	29	64	45	65	100	100	115	112+174	130	134	193	10.21	*	13	37.9	57.0
	GR	142.1	42	49	59	78+	83	100	96	109	114	98	100	-	1.09	-	2.8	2.9	
	CB	8.9	55	46	71	79+129	100	98	124	123	96	110	-	-0.20	-	10.8	1.0		
	ST	91.6	87	82	74	78	86	100	92	95	89	77	-	0.02	-	8.2	6.2		
Stratum 32 wt = 0.14 a = 20746	RW	11	181.8	179	173	118	138	220	100+136	139	159+118	117	60	-7.20	*	7	-7.8	-16.7	
	GR	83.2	220	198	176	148	158	100	128	99	162	125	100	-	-5.10	*	-15.6	-18.6	
	CB	10.4	125	267	238	338+157	100	121	142+186	140	120	-	-	-0.16	-	33.9	3.8		
	ST	126.2	77	133	86	132	148	100	84	74	52	51	103	-	4.03	-	2.5		

State/ Stratum	Sp	Num rtts	Mean birds/ route	Annual population index										Paired route comparison (1974-76 minus 1966-68)							
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a
Indiana all strata	RW	16	178.6	107	94	91	79	95	100+	84#100	103	94	93	139	-3.89	+	16	-20.8	-41.3		
	GR	106.9	82# 55	86	80	97	100+144	198	114	111	94	94	95	5.01	#		31.0	24.6	#		
	CB	12.9	117* 53	67	81	71+100	97	137#	79+130	95	-0.12			-7.5	-1.1						
	ST	115.9	199 216	132	227	144#100#160	202	145	151	230	2.49			15.6	28.0						
Stratum 14 wt = 0.16 a = 15035	RW	1	78.1	-	-	-	-	-	-	-	-	-	9			1	41.0				
	GR	71.4	-	-	-	-	-	-	-	-	-	-					8.0				
	CB	13.9	-	-	-	-	-	-	-	-	-	-					3.3				
	ST	38.7	-	-	-	-	-	-	-	-	-	-					7.7				
Stratum 15 wt = 0.21 a = 19933	RW	5	127.8	148 104	103	97	90	100	74	75	79	62	87				5	-28.9	-45.3	+	
	GR	156.2	41 23	74+	60	100	100	154	274	85	78	75	71				21.6	21.1	*		
	CB	13.0	133	65+144	57	48	100	55#134	70	92	92	-0.57					-40.6	-7.8	*		
	ST	94.7	98 111	64	459	115	100	189	293	182	143	124	0.70				9.9	39.7			
Stratum 16 wt = 0.19 a = 17381	RW	4	220.5	94	54	52+	66	76	100	95	94	89	96	103			4	-17.6	-37.8		
	GR	89.3	148	131	139	222	120	100	247	297	259	279+126					66.7	44.6			
	CB	12.5	112	64	62	56	69	100	100	144	69	100	100	-0.61				-33.3	-5.7		
	ST	108.7	159	232+129	226	112	100	218	152	244	205	273		3.86	+		40.5	9.0	+		
Stratum 31 wt = 0.44 a = 41142	RW	6	222.3	104	112	108	84	96	100	81	93	111	101	95			6	-26.7	-72.1		
	GR	103.3	101	81	73	91	94	100	117+160	112	96	109					30.1	23.9			
	CB	12.6	86*	29	38	74	78	100	94	134	74	118	82	0.15			21.2	2.5			
	ST	157.4	252	256	151	160*184+100	162	216	108	114	211	272		2.59			5.6	17.5			
RW GR CB ST																					

Paired route
comparison (1974-76
minus 1966-68)

Paired route
comparison (1974-76
minus 1966-68)

Linear trend
1966-76

Annual population index

State/ Stratum	Sp	Num rtes	Mean birds/ route	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a	
Kansas all strata	RW	38	81.1	-	79+	93	96	102	100*	123*	96#	85	94	101	251	2.08	+	27	24.7	15.5	#	
	GR	43.8	-	56*	81+104	105	100	90	97+	78+	98	93	-	-	0.08	-	25.6	9.1	+ 8.7	3.4	#	
	CB	38.9	-	70#	95	95	103	100	97	92	91+	73*	98	-	-0.11	-	-	-	-	48.3	7.1	#
	ST	19.8	-	67+107	173	131+100	124*259	219	167+249	-	-	-	-	-	0.76	-	-	-	-	-	-	
Stratum 32 wt = 0.07 a = 15126	RW	4	73.2	-	37	29	34	42	100	85	71	67	64	59	25	2.43	-	3	61.9	25.5	#	
	GR	66.2	-	16	33	39	22	100	97	94	101	74	99	-	2.17	-	77.8	31.1	-			
	CB	59.6	-	68	40	71	44	100	98	66	65	76	76	-	2.90	+	67.1	16.9	#			
	ST	23.4	-	1	3	3	56	100#164	134	201	228	265	-	-	2.59	+	253.8	29.6	-			
Stratum 33 wt = 0.36 a = 75317	RW	15	56.2	-	93	85	96	114	100	107	123+100#135#105	-	-	-	102	2.15	*	12	32.9	14.5	#	
	GR	52.1	-	81	78	107	137	100	88	98	73+111	104	-	-	-0.51	-	-1.1	-	-0.5	-		
	CB	39.8	-	71	93	74+	93	100	93	82	75+	58#	95	-	-0.75	-	-11.5	-	-5.2	-		
	ST	27.4	-	74	127	292	212+100	128	119	124	119	196	-	-0.57	-	-	-	-	13.2	3.1		
Stratum 34 wt = 0.38 a = 81142	RW	16	102.2	-	61#	92	91	86	100	95	89	85	94	123	110	0.96	-	11	31.2	29.2	+	
	GR	45.4	-	42#	81	100	104	100	95	108	86	75	85	-	-0.39	-	-	-	24.2	8.8		
	CB	48.0	-	67#111	125	128	100	96	106	99	82+	98	-	-0.45	-	-	-	28.9	12.1			
	ST	15.5	-	71	99	84	75	100	108	115	127	91#199	-	0.74	+	-	-	42.5	6.2			
Stratum 36 wt = 0.19 a = 40243	RW	3	88.4	-	232	-	185	236	100	171	93	79	72	78	14	4.05	-	1	-	-14.0		
	GR	16.7	-	999	-	999	150	100	64	36	23	194	83	-	1.35	-	-	-	19.4	-		
	CB	11.3	-	169	-	213	107	100	35	0	106	16	53	-	-1.20	-	-	-	-3.0	-		
	ST	12.7	-	-	-	-	-	-	-	-	71	100	200	900	999	999	-	-	2.62	8.0		
RW GR CB ST																						

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route	Annual population index										Linear trend 1966-76						Comparison (1974-76 minus 1966-68)		
			Num rds	66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a
Kentucky all strata	RW	46	56.0	46*	69	69	73	84#	100	96*	120	116	108	314	4.05	*	32	69.1	29.5	*	
	GR	139.2	70*	95	106	113	92	100	104	112	95	94	81		1.48		2.4	-2.4	3.2		
	CB	15.2	51	58*	43	94	98	100	114	95	92#	77	73		0.07		-2.9	-0.4			
	ST	71.9	86+115	116	115+	90	100	143	144	165	141	132		3.85	*	40.6	27.4	#			
Stratum 4 wt = 0.06 a = 6330	RW	3	91.1	-	80	111	94	106	100	162	304	297	222	393	23	12.83	*	3	165.1	82.9	
	GR	159.8	-	128+191	#115	90	100	*147	143	240	196	167		0.67		18.2	-37.8				
	CB	17.9	-	118	47	47	135	100	104	45	194	134	106		-0.30		3.7	0.6			
	ST	41.4	-	180#	48	78	152#	100	157	170+250	130	594		4.15		80.7	23.4	#			
Stratum 14 wt = 0.47 a = 48420	RW	22	66.3	52*	79+	66	76	85+100	100+118	111	111	100	165	5.90	*	17	91.0	43.3	*		
	GR	166.4	68#	83	83+	109	91	100	105	115	80	92+	69		5.18	#	21.2	29.2	+		
	CB	11.8	96	121	95	88	88	100	118	103	86	80	77		-0.13		-13.7	-1.8			
	ST	75.7	91	111	126	124	94	100	191	169	148	140	116		4.31	*	40.0	25.0	#		
Stratum 15 wt = 0.20 a = 20622	RW	10	85.9	35*	53+	66	57#	76	100	76	90	87	84	80	77	1.72		8	24.5	17.4	
	GR	217.5	84+130	139	127	101	100	85	92	104#	75+	95		-7.80	*	-18.6	-40.8				
	CB	15.0	95	92+	67	81	88	100	84	66+	44+	55	63		0.37		-23.3	-4.2			
	ST	141.1	90	130	116	126+	88	100	80	109+160#	100	128		3.29		18.1	27.9				
Stratum 21 wt = 0.24 a = 24976	RW	8	6.4	142	68	96+158	135	100	123	127	177	77	100	41	0.48	*	3	13.3	1.2		
	GR	26.8	37+	62	143	88	67	100	133	134	111	82	78		2.15	*	-7.9	-3.1			
	CB	21.8	30	25	19	122	116	100	139	120	151#	90	72		1.01		60.4	6.7			
	ST	19.6	37	58	71	35	63	100	103	87	201	297	87		3.31	*	157.9	31.1			
Stratum 22 wt = 0.02 a = 2349	RW	3	13.7	173	446	-	-	-	100	-	173	228	166	318	8			1	8.0	30.3	
	GR	30.5	77	110	-	-	-	-	100	-	104	115	429	69					-14.6	-43.3	
	CB	12.0	14	159	-	-	-	-	100	-	70	9	42	23							
	ST	25.7	33	18	-	-	-	-	100	-	296	231	30	228							

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rts	birds/ route	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chn	abs chn	p ^a
Louisiana all strata	RW	27	96.8	-	67	80	82	84	100+120	155	161	157	171	136	0.16		18	11.8	8.2		
	GR	82.6	-	133	115#	63	74	100	99	101	214*	99	163		2.15			9.6	8.2		
	CB	14.8	-	102	90	77#	109	100	88	126	163#	237	258		0.57	#		34.2	4.2		
	ST	18.3	-	156	126	96	124	100+159	147	382#	106	186		0.25			27.3	4.0			
Stratum 4 wt = 0.46 a = 54056	RW	13	34.0	-	109	107	95	85	100	116	103	82	71+132	71	-2.74	*		8	-29.5	-7.8	
	GR	58.7	-	333	180	126	110	100	155	116	133	129	105		-2.74			-26.9	-18.7		
	CB	11.5	-	138	133	95	88	100	83	113	91	160	181		0.49			26.8	3.0		
	ST	13.7	-	86	54	57	166	100	156	124	170	74+124		-0.40			-37.8	-5.4			
Stratum 5 wt = 0.40 a = 46423	RW	9	100.4	-	58	79	94	102	100	136	196	236	282	306	37	3.64		6	22.4	18.1	
	GR	133.0	-	97	113+	54	68	100	87	100	276	108	225		9.40	#		44.0	52.4		
	CB	19.0	-	129*	68	61#	130	100	100	141	301	390	338		0.81	+		48.8	6.3		
	ST	25.2	-	202	175	104	116	100	131	162	607	153	285		0.72			76.3	13.5		
Stratum 6 wt = 0.14 a = 15890	RW	5	298.2	-	70	75	67	69	100	84	82	91	80	74	28	-0.12		4	18.5	33.7	
	GR	16.7	-	150	66	33	62	100	129	23	20	29	143		-2.40	+		-77.2	-29.5		
	CB	13.6	-	62	84	91	91	100	56	104	96	137	310		0.16			17.6	2.4		
	ST	14.0	-	106	185	190	82	100	333	140	434	112	163		1.07			98.7	7.8		

RW GR CB ST

Paired route
 comparison (1974-76
 minus 1966-68)

Annual population index

State/ Stratum	Sp	Num rtrs	Mean birds/ route	Linear trend 1966-76												Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	% chg	abs chg
Maine all strata	RW	39	14.0	334	279	150	134	193	100	124	113	132#118	114	99	-1.05	*	7	-14.9	-3.8
	GR	14.2	340	406	108	126	82	100	64	97	121	86	67	-0.31		5.2	1.0		
	CB	6.4	133	160	63	161	187 [#] 100	132	125	77	46	56	-0.06		-47.8	-3.2			
	ST	42.7	886	125	107	116	97	100	111	91	64*	98	84	-3.56	*	-33.7	-27.4	+	
Stratum 12 wt = 0.02 a = 1886	RW	4	20.9	86	71	-	-	100	86	94	69	73	58	16	-0.80		1	-18.7	
	GR	28.5	106	127	-	-	-	100	102	96	107	108	77	-4.44	*			-26.7	
	CB	5.9	100	120	-	-	-	100	57	210	0	0	0	-0.51				-8.3	
	ST	71.2	724	102	-	-	-	100	119+	60+102	135	118	-25.97	*				-205.0	#
Stratum 27 wt = 0.28 a = 22626	RW	21	19.9	-	-	117	88+135	100	91	82	75	77	94	54	-1.74	*	3	-32.7	-10.7
	GR	19.1	-	-	253	127	143	100	104	140	103	78	80	-0.02		19.8	4.5		
	CB	9.6	-	-	23	144	182	100	106	87	64	34	36	-0.07		135.0	2.7		
	ST	65.9	-	-	69	84	106	100	111+	94	74	73	79	-5.07	*	-24.4	-21.5	#	
Stratum 28 wt = 0.69 a = 55571	RW	14	11.4	-	313	163	178	248	100+159	146	207	175	154	29	-0.78	+	3	-1.8	-0.4
	GR	11.7	-	-	361	56	126	63	100	36	66	106	74	47	-0.29		3.2	0.5	
	CB	5.0	-	-	600	200	200	200	100	157	157	86	57	77	-0.04		-63.5	-5.4	
	ST	32.7	-	-	164	139	140	90	100	111	90	55#108	85	-2.17				-32.9	-23.6

RW GR CB ST

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index								Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)				
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg
Manitoba all strata	RW	17	57.1	-	118	120	92	89	100+121	123	123	115	121	94	9.37	*	10	42.1	15.4	
	GR	4.0	-	337	95	282+	94	100	149	168	148	213	155		0.54	*		143.8	2.3	
	CB	15.2	-	67	164	102*	70*	100	101	83	106	103	116		0.47	+		28.5	4.5	
	ST	9.0	-	10+	366+100	92	100	82	155	117	140	210		2.21	*			420.0	8.4	
Stratum 28 wt = 0.04 a = 7236	RW	1	53.8	-	-	-	-	-	-	-	-	-	-		-18.7					
	GR	4.8	-	-	-	-	-	-	-	-	-	-	-					4.0		
	CB	5.1	-	-	-	-	-	-	-	-	-	-	-					2.7		
	ST	11.4	-	-	-	-	-	-	-	-	-	-	-					-7.3		
Stratum 29 wt = 0.46 a = 91647	RW	2	32.0	-	-	-	-	-	-	-	-	-	-		8					
	GR	2.5	-	-	-	-	-	-	-	-	-	-	-					0		
	CB	0.0	-	-	-	-	-	-	-	-	-	-	-					0		
	ST	5.5	-	-	-	-	-	-	-	-	-	-	-					0		
Stratum 30 wt = 0.39 a = 78140	RW	9	76.4	-	125	121	92	84	100+126	128	131	116	134	62	3.04	#	6	34.9	22.2	
	GR	5.4	-	502	89	296+	77	100	145	200	132	298	153		0.14			118.5	3.2	
	CB	28.4	-	43	180	89*	67#	100	104	79	109	112+138			0.44			18.6	5.8	
	ST	11.2	-	18	18	77	82	100	66	144	85	101	265		1.80	#		585.7	16.4	
Stratum 37 wt = 0.06 a = 12059	RW	2	110.6	-	-	-	-	-	-	-	-	-	-				1	117.8		
	GR	6.2	-	-	-	-	-	-	-	-	-	-	-					10.7		
	CB	31.6	-	-	-	-	-	-	-	-	-	-	-					46.2		
	ST	6.3	-	-	-	-	-	-	-	-	-	-	-					20.2		
Stratum 40 wt = 0.06 a = 11577	RW	3	72.0	-	63	63	95	88	100#	84	88	77	85	19	-0.82		2	9.2	6.3	
	GR	3.4	-	0	0	87	400	100	100	122	156	322	25		0.45			235.0	4.7	
	CB	35.9	-	448	244	293	137+100	142	134	146	184	136			-0.80			-21.4	-9.9	
	ST	22.3	-	24	40	70	140	100	210	196	329	274	56		2.53			310.0	18.6	

Paired route
comparison (1974-76
minus 1966-68)

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route										df	slope	P ^a	abs chg	% chg		
		Num rnts	66	67	68	69	70	71	72	73	74							
Mass. all strata	RW	22	37.8	67	70	79+	98	87	100	109+	84	78	82	78	160	-0.26		
	GR	50.2	50.2	36	79	98	101	80+100	88	109	113#	86	91	0.00	0.00	-3.2		
	CB	6.3	26	53	52+	82	92	100	121	85	102	83	81	-0.12	2.0	3.1		
	ST	97.5	137	98	131	140	123	100	112	127+162	150	131	-	-0.29	0.2	0.1		
Stratum 8 wt = 0.10 a = 1974	RW	3	54.7	-	134	173	160	139	100	67	53	68	47	-	0.17	2	-6.5	
	GR	114.9	114.9	-	107	187	155	72	100	53	55	213	83	-	9.41	-	-3.8	
	CB	9.4	9.4	-	0	0	31	23	100	150	25	100	0	-	-0.40	-	122.5	
	ST	87.4	87.4	-	19	46	125	251	100	48	77	493	239	-	10.89	+	-1.0	
Stratum 12 wt = 0.62 a = 12569	RW	12	36.9	70	74	80	94	68+100	110	82	82	89+	75	96	-0.35	12	-7.7	
	GR	52.3	52.3	34	75	86	99	81	100	90	109	97	84	91	-1.36	-	-2.8	
	CB	5.3	5.3	52	105	89	115	91	100	136	92	119	102	68	-0.20	-	-11.3	
	ST	107.7	181	129	193	157	138+100	139	134	165	152	130	-	-3.34	+	-	23.9	
Stratum 27 wt = 0.28 a = 5726	RW	7	33.8	-	44	54+	90	114	100	119	101	71	77	97	52	-0.21	4	-21.1
	GR	23.2	23.2	-	90#153	103	100	100	128	184	108	112	103	-	-0.25	-	-45.0	-6.3
	CB	7.5	7.5	-	20	38	71#128	100	95	84	80	72+107	-	0.17	-	114.7	3.9	
	ST	78.6	41	25	75	49#100	57	99	72	102	94	-	-	-	2.55	23.9	10.0	

RW GR CB ST

RW GR CB ST

Paired route comparison (1974-76 minus 1966-68)

State/ Stratum	Sp	Annual population index												Linear trend 1966-76							
		Mean birds/ route	Num rtes	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	chg	% chg	abs chg
Michigan all strata	RW	55	89.8	60*	97	79#	94+102	100	93	94	96	98	104	224	-0.43	#	17	8.1	7.5	22.7	10.4
	GR	56.8	85	84	91	104	109	100	108	104	113	99	92		1.11	#		-0.5	-0.1	-0.5	34.8
	CB	15.5	132	136	114	94+153	100	117	116+146	124	146				-0.36	#					
	ST	98.6	88	86	102	101	93	100	104	100	110	122	118		4.29	*					
Stratum 16 wt = 0.39 a = 57166	RW	23	172.4	95	96+	81+	94	99	100	91	88	91	91	113	-2.35	#	9	5.4	9.5	19.9	21.0
	GR	123.4	96	87	94	114	110	100	108	106	119	102	101		1.95						
	CB	14.7	335	162	133+	89	112	100	95	102	105	82	91		-0.81	*					
	ST	146.4	115	104	91	99	92	100	84#111	138	149	157			2.80						
Stratum 20 wt = 0.28 a = 41808	RW	17	61.3	21	127	85	100+121	100	87	107	111	113	139	62	-0.25		4	-5.4	-3.4		
	GR	23.5	63	90	69	38	102	100	115	98	66	45	27		0.42			-10.7	-1.6		
	CB	22.2	80	123	95	80	151	100	125	134	153+120	136			-0.95	*		15.4	3.7		
	ST	83.4	46	87	114	76	104	100	84	61	69	81	77		4.82	*		169.6	70.9		
Stratum 28 wt = 0.33 a = 48182	RW	15	16.8	87	40	52	91	94	100	134	120	119	136	164	49	1.69	*	4	73.6	14.5	
	GR	7.0	39	20	65	55	95	100	71	80	72	131	83		0.72				356.5	8.2	
	CB	10.8	69	89	109	142	280	100	162	118	244	299	399		0.69	*			34.0	3.3	
	ST	55.2	201+	45	139	112	81	100	188	107	90	102	82		5.60				52.4	27.6	

State/ Stratum	Sp	Num rnts	Mean birds/ route	Annual population index								Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Minnesota all strata	RW	43	94.4	-	93	91#120	104	100*	147	139	137	116	131	197	1.14	#	19	47.0	36.6	+	
	GR	66.3	-	89	70	104	80+100+127	151	176	161	172	2.38	#	83.0	37.7	*	86.6	8.6	#		
	CB	16.6	-	91	88	94#133#100	97	134	160#224+185	0.67	*#	96.6	13.4	33.2	13.4						
	ST	36.0	-	58	84	137+	84	100	118	180	129#102#270	1.92	#	49.6	28.4						
Stratum 17 wt = 0.04 a = 8537	RW	3	102.9	-	36	46	79	73	100	86	52	60	65	76	21	6.78	*	2	153.6	74.5	+
	GR	85.0	-	32	47	108	36	100	76	83	66	105	90	1.36	68.4		132.9	11.3			
	CB	16.4	-	50	45	28	68	100	102	39	39	46	40	0.74	-0.22		49.6				
	ST	66.1	-	78	247	578	136	100	91	61	73	58	172								
Stratum 20 wt = 0.13 a = 27211	RW	7	111.1	-	98	115	114	120	100	126	119	112	123	129	46	5.84	*	5	15.9	12.1	#
	GR	26.1	-	69	114	52#	75	100	65	80	165	218	142	2.25	*	47.1		6.4			
	CB	20.4	-	77	106	108	138	100	124	68	98	96#	60	-0.15		16.2		2.9			
	ST	17.5	-	59	47	166	94	100	36	74	85	74	220	0.73		74.7		5.9			
Stratum 28 wt = 0.30 a = 62468	RW	15	36.6	-	77	80	118	89	100	74	99	129	119	118	53	-0.89		5	240.7	73.9	
	GR	3.2	-	88	78	39	86	100	75+475	475	430	86	0.52			1350.0		18.9			
	CB	13.4	-	268	226	127	262	100	156	123	236	274	182	0.13		133.3		6.8			
	ST	9.3	-	84	58	263	200	100	543	176	206	248	992	-0.03		83.3		4.0			
Stratum 30 wt = 0.05 a = 10036	RW	3	103.7	-	-	-	-	-	-	-	-	-	-	3		0		0			
	GR	11.3	-	-	-	-	-	-	-	-	-	-	-			0		0			
	CB	24.7	-	-	-	-	-	-	-	-	-	-	-			0		0			
	ST	7.0	-	-	-	-	-	-	-	-	-	-	-			0		0			
Stratum 32 wt = 0.05 a = 10036	RW	1	102.1	-	-	-	-	-	-	-	-	-	-	7		1	44.7				
	GR	203.9	-	-	-	-	-	-	-	-	-	-	-			0	0	0			
	CB	18.2	-	-	-	-	-	-	-	-	-	-	-			0	0	0			
	ST	110.9	-	-	-	-	-	-	-	-	-	-	-			0	0	0			

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index								Paired route comparison (1974-76 minus 1966-68)							
				1966-76								Linear trend 1966-76							
Stratum 40	RW	14	127.6	-	105	96	129	110	100#163	151	146	113	132	67	1.65	6	13.5	17.0	
wt = 0.42	GR		112.5	-	91	66	104	82	100	121	156	179	160	184		2.75	74.7	57.3	*
a = 87071	CB		16.7	-	66	56	87	103	100	63	171	192+352	321		1.79	*	142.7	12.7	
	ST		52.7	-	50	74	108	71	100	100	189	116	96*309		2.92		22.0	16.4	

RW
GR
CB
STRW
GR
CB
STRW
GR
CB
STRW
GR
, CB
STRW
GR
CB
ST

Paired route
 comparison (1974-76
 minus 1966-68)

State/ Stratum	Sp	Num rtrs	Mean birds/ route	Annual population index								Linear trend 1966-76							
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a		
Miss. all strata	RW	30	65.4	171*107*	83	78*106	100	91	98#	71*	90*	71	135	-0.75	*	14	-6.7	-5.0	
	GR	68.3	152#126	130+	93	117	100	102	97	91	89	85	-3.00	*	-23.4	-20.3	+		
	CB	8.5	258	477	394	90	70#100	107#	80	81	83	141	-0.04	#	-52.8	-7.5			
	ST	13.5	81	98#	81	79	131	100	98+	64	61	42	34	-0.62	#	19.8	2.7		
Stratum 3 wt = 0.09 a = 11168	RW	3	0.9	-	0	0	-	-	-	-	-	-	2		1	3.0			
	GR	2.8	-	-	-	-	-	-	-	-	-	-				4.0			
	CB	0.2	-	-	-	-	-	-	-	-	-	-				1.0			
	ST	0.5	-	-	0	0	-	-	-	-	-	-				2.0			
Stratum 4 wt = 0.74 a = 90868	RW	22	45.8	92	74	73	88	103	100	109	102	84#111+	96	110	1.42	*	11	43.1	10.7
	GR	66.5	124#	95	129	90	104	100	106	91	92	98+	80	-0.35	*	4.6	2.4		
	CB	6.1	71	113	142	98	88	100	131	110	95	105	157	0.46	*	102.8	3.7		
	ST	11.7	98	100	74	80	136	100	84	63	79	34	36	0.10		56.7	5.1		
Stratum 5 wt = 0.17 a = 20464	RW	5	188.0	257	137	88	75+108	100	75	91	59	72+	53	23	-10.97	+	2	-23.7	-79.2
	GR	111.8	230	207	154	113	151	100	88	107	85	62	79	-16.60	*	-47.0	-134.4	*	
	CB	23.9	947	999	999	105	56*100	89	43	76	63#163	-2.32		-14.28	*	-89.2	-61.7		
	ST	28.5	69	96	85	75	120	100	127#	68	35	80	43			-18.9	-7.8		
		RW																	
		GR																	
		CB																	
		ST																	

RW GR CB ST

Paired route
 comparison (1974-76
 minus 1966-68)

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index										Linear trend 1966-76					Paired route comparison (1974-76 minus 1966-68)				
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a		
Missouri all strata	RW	37	87.4	-	70	62#	81	97	100#	128+154	154	149	169	166	5.81	*	16	69.2	39.9	*			
	GR	65.8	-	87	90	97	97	100	74	57	66	53	58		0.38			33.5	17.4	#			
	CB	22.2	-	122	107	107	109	100	112	126#	93	103			0.62	*		24.0	4.6				
	ST	33.8	-	104	92	105	79	100#	166#	64	75	62	90		0.25			27.5	8.6				
Stratum 5 wt = 0.06 a = 10629	RW	2	244.8	-	-	-	-	-	-	-	-	-	-	15	15.24	*	2	54.1	179.5				
	GR	169.4	-	-	-	-	-	-	-	-	-	-	-		-1.39			12.4	17.8				
	CB	10.3	-	-	-	-	-	-	-	-	-	-	-		-0.83			-26.7	-4.4				
	ST	121.3	-	-	-	-	-	-	-	-	-	-	-		-0.37			29.8	29.7				
Stratum 19 wt = 0.41 a = 72652	RW	15	32.1	-	121	96	106	100	152	205	207	231	217	62	1.33	#	5	63.8	18.0				
	GR	50.0	-	60	60	82	83	100	73	47	48	44#	35		1.05			91.6	29.4	+			
	CB	20.2	-	87	82+	94	90	100	64	86	68	60	68		0.61	#		32.4	4.5				
	ST	20.6	-	46	85	83	85	100	368	76	182	104	87		-0.14			130.4	18.0				
Stratum 31 wt = 0.12 a = 21256	RW	5	151.5	-	60	40	62	62	100	128	209	194	204	186	22	12.38	*	3	95.7	83.9			
	GR	74.4	-	90	146	81	86	100	53	53	72	40*	63		-4.48	*		-32.2	-28.2				
	CB	18.2	-	256	146	246	200	100	218	349	384	266	212		0.14			13.3	2.7				
	ST	41.1	-	45	99	75	70	100	107	92	114	84	92		-2.24	+		-16.4	-8.7				
Stratum 32 wt = 0.25 a = 44022	RW	9	125.4	-	65	44#	77	114	100	127	142	153+112	152	42	6.21	*	4	22.0	18.5				
	GR	58.9	-	122	87	108	119	100	50	65	64	64	67		-2.66	#		-12.5	-7.0				
	CB	29.3	-	95	95	82	121	100	124	88	148	93+122			1.55	#		75.9	16.7				
	ST	34.2	-	322	78	135	75	100	48	99	43	62	210		1.64			-21.7	-8.5				
Stratum 33 wt = 0.17 a = 30137	RW	6	65.2	-	62	122	114	118	100	154	141	134	168	206	25	8.11	*	2	160.6	43.7			
	GR	71.8	-	119	151	230	91	100	183	105	127	104+191			7.21			152.0	55.8				
	CB	23.6	-	211	177	137	90	100	170	124	134	122	112		0.14			-30.0	-8.3				
	ST	29.1	-	164	161	286	96	100	386	87	87	84	134		1.13			68.3	15.5				

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route	Num rds	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Montana all strata	RW	31	18.6	-	-	95	106	108	100#	72	82	55	91#	49	142	-1.27	*	12	-45.7	-13.9	+
	GR	1.6	-	-	-	105	416	102	100	89	48#	194	316	127		0.02			69.2	0.9	
	CB	7.0	-	-	-	111+	46#	100	100	91	142	123	404	359		0.87	*		85.4	4.1	+
	ST	12.1	-	-	-	133	231	139	100+317	244	538	292	180		0.65			41.4	3.6		
Stratum 38 wt = 0.23 a = 86423	RW	6	30.4	-	-	105	149	103	100	74	72	51	111	65	24	-2.67	#	2	-65.4	-42.5	
	GR	2.3	-	-	-	65	300	300	100	400	0	86	80			0.37			53.3	0.8	
	CB	8.0	-	-	-	134	31	110	100	200	230	90	823	652		2.23	*		121.7	7.3	
	ST	5.4	-	-	-	117+	350	133	100	67	200	900	400	367		0.21			-	2.3	
Stratum 39 wt = 0.39 a = 138428	RW	10	17.6	-	-	107	96	126	100	90	114	61	124	39	46	-0.63		4	-32.1	-7.6	
	GR	2.3	-	-	-	119	679	167+	100	111	67	278	494	62		-0.22			68.0	1.7	
	CB	6.8	-	-	-	78	16	89	100	52	127	143	716	0		0.20			-28.9	-1.5	
	ST	11.9	-	-	-	380	843	300	100	800	808	999	797	412		0.83			59.1	6.8	
Stratum 64 wt = 0.19 a = 73015	RW	4	5.0	-	-	140	327	213	100	93	100	100	40	87	25	-1.19	#	3	-45.7	-3.2	
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0		0.00			0.0	0	
	CB	4.4	-	-	-	140	170	150	100	100	50	110	170	240		0.17			23.4	1.1	
	ST	6.7	-	-	-	204	182	223	100	159	23	36	73	100		-1.61	*		-66.0	-9.9	
Stratum 65 wt = 0.19 a = 71435	RW	11	20.2	-	-	73	61	85	100	49	59	51	52	44	47	-0.94	#	3	-12.7	-3.3	
	GR	0.9	-	-	-	0	0	0	100	0	0	0	0	0		0.00			0.0	0	
	CB	9.1	-	-	-	123	92	85	100	148	208	208	217	370		1.33			544.4	14.7	
	ST	26.2	-	-	-	54	82	66	100	257	183	434	246	158					3.11	12.4	

Paired route
 comparison (1974-76
 minus 1966-68)

State/ Stratum	Sp	Num rtrs	Mean birds/ route	Annual population index												Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	r ^a	n	% chg	% abs chg	p ^a				
Nebraska all strata	RW	33	71.4	-	92	85	80#	104	100	79	80	84	98	97	165	-1.98	20	-27.3	-19.4	+					
	GR	47.8	-	82	116	100	108	100	116+	88	89	100	87		-0.59		-6.0	-2.7							
	CB	27.3	-	76	88	92	84	100	113	132	99	113	116		0.13		-0.7	-0.2							
	ST	9.9	-	102	61	76	96	100	53+120	111	160	164		0.08		10.0	1.1								
Stratum 32 wt = 0.19 a = 37236	RW	9	72.3	-	127+	98	89	99	100	107	65	48	62	57	53	-2.37	+	7	-28.0	-22.1					
	GR	73.8	-	78+130	128	138	100	79	80	61	75	67		-2.65		-2.0	-1.2								
	CB	38.9	-	109	92	112	115	100	120	152	90	147	185		0.12		-10.4	-4.6							
	ST	17.2	-	66	27	39	80	100+	46	222	196	248	337		0.39		43.3	6.1							
Stratum 34 wt = 0.26 a = 51891	RW	11	96.0	-	59	55	61	84	100	59+	77	83	77	70	57	-1.68	6	-13.8	-12.3						
	GR	92.9	-	53	103	84	96	100	118	84	80	91	76		-0.90		-8.3	-7.4							
	CB	44.0	-	56	75	82	87	100	117	103	101	100	96		1.90		74.4	23.6							
	ST	15.2	-	25	83	114	90	100	41	75	76	119	129		0.52		43.0	5.8							
Stratum 36 wt = 0.50 a = 98941	RW	13	65.4	-	130	129	106	142	100	93	98	113	147	158	55	-0.20	7	-36.8	-24.2						
	GR	19.3	-	322	174	136	106	100	198	128	358	331	327		0.28		-4.9	-1.0							
	CB	17.0	-	73	100	87	57	100	105	157	87	85	80		0.79	+	-42.9	-11.1							
	ST	5.4	-	280	80	48+136	100	106	158	119	158	106			-0.27		-33.3	-3.2							

Paired route
comparison (1974-76
minus 1966-68)

Annual population index										Linear trend 1966-76							
State/ Stratum	Sp	Num rt's	Mean birds/ route	66	67	68	69	70	71	72	73	74	75	76	af	slope	p ^a
Nevada	RW	21	12.6	-	-	111	102	61	100+133	125	155	253	161	86	-0.89	+	
all strata	GR	0.0	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	
	CB	0.4	-	-	-	185	92	109	100	132	38	226	154	77	-0.05	-0.05	
	ST	4.0	-	-	-	93	296	175	100	117	135	66	123	31	0.47	*	

RW GR CB ST

RW GR CB ST

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index								Linear trend 1966-76				Comparison (1947-6 minus 1966-68)				
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg
New Brunswick all strata	RW	27	23.1	89	81	94+110	100	100	114	94#122	133	147	193	1.78	*	19	78.3	15.9	*	
	GR	28.9	93	118+143	136	142*	100	108	113*	78	67	89	-0.93	*	-23.5	-8.7	-4.8	*		
	CB	12.2	96	117	115	114	96	100+	70	72	71#	48	70	-0.75	*	-30.8	-4.8	*		
	ST	53.0	75	78*109	109	109	104	100	110	104	88	92	122	1.17	#	15.3	8.3			
Stratum 28 wt = 0.89 a = 63401	RW	24	25.8	90	82	94+110	101	100	114	94#120	132	146	171	1.94	*	17	76.3	17.4	*	
	GR	32.3	93	118+144	138	143*	100	110	115*	79	67+	92	-1.03	*	-23.7	-9.8	-5.4	*		
	CB	13.6	95	116	115	114	96	100+	68	72	71#	48	68	-0.85	*	-31.0	-5.4			
	ST	59.7	75	78*109	109	109	104	100	110	103	87	92	123	1.32	#	15.3	0.3			
Stratum 29 wt = 0.11 a = 8166	RW	3	2.4	21	0	88	88	12	100	88	88	262	204	281	22	0.50	*	2	525.0	4.2
	GR	2.4	86	129	100+	27	64	100	36	0	42	83	23	-0.11		-8.1	-0.3			
	CB	1.1	400	400	300	300	200	100	600	120	120	120	420	0.04		11.1	0.2			
	ST	0.8	84	127	253	0	100	100	300	999	0	0	0	0.00		25.0	7.4			

RW GR CB ST

RW GR CB ST

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp rte	Mean birds/ route	Mean										df	slope	p ^a	n	% chg	abs chg	p ^a	
			66	67	68	69	70	71	72	73	74	75								
New Hampshire	RW	23	29.8	52+	78	91	85	82	100	121#	83	82	79	89	189	0.30	19	11.5	3.2	
	GR	15.1	71+	90	92	103	123	100+138#	111	84	70	104				0.16		15.3	2.1	
	CB	6.6	93	86	78	101	97	100	106	115	96	104	92			0.02		1.6	0.1	
all strata	ST	52.4	108	83+140	106	118	100	109	109	88#116	131				-0.48		-8.4	-4.7		
Stratum 12	RW	2	33.6	-	-	-	-	-	-	-	-	-	-	-	17	1.82	#	2	69.9	15.8
wt = 0.06	GR	31.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.65	-	-14.9	-5.2	
a = 1440	CB	10.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.19	-	-13.0	-1.4	
	ST	88.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-32.2	-34.2	

RW GR CB ST RW GR CB ST

		Annual population index												Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)			
		Mean birds/ route		1966										df		slope		P ^a		% chg	abs chg	P ^a	
State/ Stratum	Sp	Num rtes	Sp	66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a		
New Jersey all strata	RW	21	38.4	101	107	80	111	107	100	87	100	118	105	78	110	-0.34	8	-5.7	-1.1				
	GR	144.6	88	89	88	98	102	100	88	94	81	82						-7.7	-5.8				
	CB	3.3	134	85	41	84	115	100	172	93	107	76	51					-17.4	-0.4				
	ST	161.8	82	91+	66	71*	93	100	83	101	87	95	106	0.88				5.7	4.6				
Stratum 4 wt = 0.58 a = 11368	RW	14	28.4	80	81	73	105	97	100	88	147	130	109	74	0.36	7	0.0	0					
	GR	148.0	103	98	104	114	108	100	72	93	82	68	82					-7.1	-8.5				
	CB	2.2	107	62	23	64	150	100	120	150	90	77	33					-23.7	-0.9				
	ST	184.1	120	136+100	104	104	100	107	105	105	107	105	131					4.9	6.4				
Stratum 10 wt = 0.21 a = 4038	RW	3	40.6	-	-	-	131	140#100	95	85	73	78	51	12	-3.61	+	0	0	0	0			
	GR	152.0	-	-	-	-	92	104+100	140	124	99	144	94					6.33	0	0			
	CB	4.4	-	-	-	-	45	90	100	270	120	160	100					0.48	0	0			
	ST	134.5	-	-	-	-	42	135	100	85	115#84	105	99					2.79	0	0			
Stratum 12 wt = 0.12 a = 2375	RW	2	68.2	-	-	-	-	-	-	-	-	-	-	12	3.47	0	0	0	0	0			
	GR	74.3	-	-	-	-	-	-	-	-	-	-	-		-6.90								
	CB	4.0	-	-	-	-	-	-	-	-	-	-	-		-0.70								
	ST	125.6	-	-	-	-	-	-	-	-	-	-	-		3.84								
Stratum 13 wt = 0.09 a = 1696	RW	2	59.1	-	-	-	-	-	-	-	-	-	-	12	-2.61	1	-12.3						
	GR	202.8	-	-	-	-	-	-	-	-	-	-	-		15.19		-9.7						
	CB	7.2	-	-	-	-	-	-	-	-	-	-	-		0.06		1.7						
	ST	127.8	-	-	-	-	-	-	-	-	-	-	-		11.27		10.3						

State/ Stratum	Sp	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)						
			Num rnts	66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a
New Mexico all strata	RW	27	11.4	-	-	71	68	79	100	84	60	65	60	46	80	1.19	*	10	80.7	4.2	
	GR	0.6	-	-	0	0	177	100	64	37	279	59	44	0.05	-	-	-	-	2.1	0.9	
	CB	3.9	-	-	218	185	122	100*	241	208#	588	839	792	0.20	+	42.9	*	-	1.8	+	
	ST	6.5	-	-	17+	24	70	100	109	59	87	56	70	0.42	+	325.8	*	300.0	9.0	10.1	
Stratum 35 wt = 0.27 a = 85232	RW	6	11.4	-	-	533	400	300	100	250	66	230	0	0	21	1.47	*	3	355.6	9.6	
	GR	0.9	-	-	100	100	100	100	100	0	0	0	0	0.00	0.0	0.0	0.0	0	0	0	
	CB	2.0	-	-	200	100	100	100	200	200	350	999	999	0.31	*	257.1	1.8	-	1.8	+	
	ST	4.3	-	-	1	12	100	100	100	41	130	0	46	0.76	+	300.0	*	300.0	9.0	10.1	
Stratum 54 wt = 0.05 a = 16845	RW	2	0.7	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0	0	0	
	GR	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	CB	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
	ST	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	
Stratum 62 wt = 0.07 a = 21743	RW	2	36.9	-	-	-	-	-	-	-	-	-	-	-	-	-	7	1	5.0	0	
	GR	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	1.7	
	CB	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.7	12.7	
	ST	14.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Stratum 81 wt = 0.25 a = 78632	RW	6	13.5	-	-	100	100	100	100	15	0	0	0	0	17	1.93	*	2	-	1.3	
	GR	0.1	-	-	0	0	0	100	0	0	0	0	0	0	-0.03	-0.03	-0.03	-0.03	0.0	0	
	CB	5.8	-	-	183	325	100	100	34	34	189	225	150	0.27	0.27	0.27	0.27	0.27	60.0	1.5	
	ST	2.4	-	-	227	100	100	100	100	100	100	100	64	64	0.29	*	0.29	*	0.29	0.0	0
Stratum 84 wt = 0.36 a = 112007	RW	11	6.5	-	-	60	84	60	100	88	52	36	175	124	26	0.80	*	3	52.0	2.6	
	GR	0.9	-	-	0	0	550	100	200	125	950	200	150	0.11	0.11	-	-	-	5.8	5.8	
	CB	3.7	-	-	220	80	120	100	120	120	120	200	200	0.08	0.08	-8.1	-8.1	-8.1	-0.3	-0.3	
	ST	10.3	-	-	18	19	72	100	111	58	81	51	57	0.05	0.05	230.0	18.4	18.4	18.4	18.4	

Paired route
 comparison (1974-76
 minus 1966-68)

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index												Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a				
New York all strata	RW	107	141.6	100	106	110#	121	119*	100	105	115+105	99+106	732	-0.99	82	-5.4	-8.0								
	GR	59.2	78	75	80	91	94	100	87	84	74	85#	64	-0.49		-5.8	-3.3								
	CB	11.3	92	81	80	96	106	100	104#	84	83	76	80	-0.14		1.8	0.2								
	ST	121.3	170	96	98	102	117	100	98	109	115	108	107	-0.91		-3.8	-4.7								
Stratum 8 wt = 0.03 a = 3802	RW	5	85.8	54	68	70	93	66	100	60	74	61	74	55	29	1.41	2	23.4	10.7						
	GR	152.7	58+107	125	116+109	100	130	136	124	148	125			2.67		-5.1	-8.2								
	CB	5.0	373	195	130	125	138	100	115	29	67	19	38		-1.14	*	-85.0	-12.5							
	ST	171.2	65	56	66	125#	78	100	88	83	156	114	131	5.59		73.5	87.7								
Stratum 12 wt = 0.03 a = 3424	RW	2	88.8	-	-	-	-	-	-	-	-	-	-	13	-5.11	2	-25.0	-18.1							
	GR	64.6	-	-	-	-	-	-	-	-	-	-	-	-4.25		-43.0	-29.9								
	CB	6.0	-	-	-	-	-	-	-	-	-	-	-	-0.32		-36.9	-2.4								
	ST	84.3	-	-	-	-	-	-	-	-	-	-	-	-4.60		-45.1	-46.2								
Stratum 13 wt = 0.09 a = 10961	RW	15	162.2	127	120	126	132	111	100	106	97	109	115	108	118	-5.21	*	15	-16.2	-29.3					
	GR	54.4	100	82	74	83	84+100#	62	59	75	85	68		-2.46	*	-16.0	-9.5								
	CB	7.6	195	117	94	75#	147	100	118	95	121	94	115		-0.73	*	-48.1	-5.0							
	ST	147.1	114	98	104	117	103	100	99	104	118	134	119	-2.96		-5.9	-8.8								
Stratum 16 wt = 0.16 a = 19865	RW	18	225.4	102	93	100	110	116	100	114	124	116	101	117	138	2.88		14	4.8	10.8					
	GR	123.3	69	50	59	68	83	100	83	61	66	76	47		1.10		3.9	4.1							
	CB	14.6	148	82	69	77	79	100	105+	60	56	54	50		-0.11		-11.9	-1.7							
	ST	224.2	149	99	91	96	148	100	106	98	105	109	89	2.85			-0.0	0							
Stratum 18 wt = 0.08 a = 10070	RW	5	162.2	-	76	113	135	108	100+115	162	155	135	139	24	15.72	*	2	110.3	128.2						
	GR	41.0	-	119	61+125	128	100	28	89	56	38	54			1.96		292.0	29.2							
	CB	18.0	-	14	62	140	128	100	79	111	272	226	206			1.23	*	247.8	16.6						
	ST	94.2	-	84	74	143	93	100	59	113	80+	97	122			4.94		139.6	69.8						

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)					
				Linear trend 1966-76																	
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Stratum 24	RW	38	157.9	95	116	115	114	121*	100	99	108	94	92	100	299	-2.58	*	34	-16.8	-29.3	+
wt = 0.39	GR	52.5	68	73	77+	96	92	101#	79	88	68					-1.01	-0.4	-0.2			
a = 48223	CB	10.7	104	99	92	82	100	100	92	95	64	54	63			-0.17	-6.6	-0.7			
	ST	124.4	204	92	104	97	110	100	97	118	118	100	104			-2.84	+		-6.2	-8.1	
Stratum 26	RW	23	51.3	126	110+	97	134	137	100	104	107	88	92	94	103	-3.14	#	12	-33.7	-24.5	
wt = 0.21	GR	19.9	77	130	183	109	128	100#	143#	104	80#	130	93			-0.77			-62.5	-20.0	
a = 26133	CB	10.9	48	66	73	116	119	100	118	89	102	98	115			-0.19	17.3	1.9			
	ST	39.9	105	111	104	85	113	100	79	93	130	115	159			-1.83	#		-50.4	-35.3	
Stratum 27	RW	1	66.0	-	-	-	-	-	-	-	-	-	-	-	8			1	-77.0		
wt = 0.01	GR	12.0	-	-	-	-	-	-	-	-	-	-	-	-					-9.0		
a = 1404	CB	8.8	-	-	-	-	-	-	-	-	-	-	-	-					-6.0		
	ST	37.3	-	-	-	-	-	-	-	-	-	-	-	-					-35.0		
RW																					
GR																					
CB																					
ST																					
RW																					
GR																					
CB																					
ST																					

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum		Annual population index												Linear trend 1966-76						Comparison (1974-76 minus 1966-68)			
Mean birds/ route	Num rtes	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a				
N. Carolina all strata	RW	31	12.8	109	89	63	63+	93	100	108	106	92	100#	75	163	0.19	17	21.6	1.0				
	GR	72.8	33	59	79	95	99	100	112	200	107	93	144			4.52	+	66.6	32.8				
	CB	4.8	26+	37	50	40	68	100	69	99	98	82	102			0.38	*	76.7	2.3				
	ST	42.8	69	96	88	96#	122	100	110	113	126	106	129			0.00		5.0	2.0				
Stratum 3 wt = 0.25 a = 32111	RW	10	8.1	213	76	76	55	102	100	128	61	81	68	65	64	0.39	7	-15.8	-1.2				
	GR	85.3	36	61	100	87	122	100	96	118	156	121	146			1.67		74.1	49.6				
	CB	7.3	9	17	9+	65	61	100	95	136	161	95	124			0.96	*	253.8	6.6				
	ST	36.2	31	53	79	67	125	100	144	92+121	115	93				-0.05		-15.1	-5.8				
Stratum 4 wt = 0.21 a = 26980	RW	4	15.2	115	36	55*	92	96	100	118	107	114	123	57	25	-0.02	3	15.3	1.9				
	GR	75.1	16	37	72	93	73	100	104	139	73	67	57			3.51		28.1	15.2				
	CB	2.3	220	220	0	67	133	100	100	333	133	200	433			0.03		4.2	0.1				
	ST	41.3	111	178	116	133	133	100	80	91	111	109	158			0.14		15.4	6.6				
Stratum 11 wt = 0.36 a = 42926	RW	10	17.3	84	133	71	48+	80	100	84	116	92	132	102	57	0.17	+	6	78.8	6.3			
	GR	89.3	53+	96	98	119	126	100	127	382	103	96	229			8.70		53.2	33.7				
	CB	5.2	20#	36	105	25	84	100	54	78	87	90	115			0.18		22.0	0.9				
	ST	54.1	91	99	110	125	162+100	108	177	138+	98	157				-0.30		-7.6	-4.1				
Stratum 23 wt = 0.17 a = 21373	RW	7	7.4	-	-	45	56	100	100	108+144	68	52	55			1.11		0.21	-3.0				
	GR	16.0	-	-	3	60	40	100	130	77	114	94	46					1.11	27.7				
	CB	3.3	-	-	27	40	30	100	60	30	0	0	0			0.40		0.40	1.3				
	ST	30.1	-	-	61	69	100	106	72	122	101	67						0.52	21.0				

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route										Annual population index					
		Num rts	66	67	68	69	70	71	72	73	74	df	slope	p ^a			
N. Dakota all strata	RW	25	150.7	-	113*	94	102	96	100	120	119*	94	#105	106	182	0.62	
	GR	26.4	-	15+	41	100	61*	100	116	115	96	91	110		1.58	#	
	CB	45.1	-	116	80	91	82*	100	105	108	97	103	109		0.33		
	ST	6.4	-	60	35	50	44+	100+	30	38	25	30+	12		-0.10		
Stratum 37 wt = 0.38 a = 67674	RW	8	221.5	-	111#	86	125	98	100	131	146#	95+	111	122	55	2.64	
	GR	44.5	-	12	36	107	60	#100	106	123	90	84	89		1.40		
	CB	48.0	-	108	84	102	90	100	120	111	110	110	119		-1.54	+	
	ST	7.6	-	0	30	51	48	100+	32	46	35	22+	7		-0.28		
Stratum 38 wt = 0.26 a = 467742	RW	3	125.0	-	93	112	66	82	100	96	66	70	72	66	22	-4.03	
	GR	13.5	-	0	17	82	52	100	118	68	94	66	88		1.17	#	
	CB	49.6	-	80	91	87	74+	100	103	121	70	92	74		0.57		
	ST	2.6	-	0	19	29	71	100	86	300	129	157	0		0.30		
Stratum 39 wt = 0.26 a = 46775	RW	9	81.7	-	186+	79	95	111	100	#138	#118	132	127	136	70	3.34	*
	GR	6.9	-	87	87	97	95	100	92	131	164	226			0.28		
	CB	39.0	-	448	104	102	118	100	103	124	156	120+198			2.35	*	
	ST	3.3	-	33	17	16	16	100	30	34	22	55	8		-0.03		
Stratum 40 wt = 0.10 a = 18223	RW	5	129.6	-	130	132	113	110	100	114	145#	115	157#	111	35	-1.94	
	GR	42.8	-	28	97	62	52	100	174	144	121	152	230		6.58		
	CB	38.1	-	39	24	48	28	100	74	51	49	79	51		1.46		
	ST	19.5	-	384	142	178	74	100	23	11	9	23	18		-0.63		

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rsts	Mean birds/ route	Annual population index										Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	p ^a
Nova Scotia	RW	24	11.6	58	65	80	89	92	100	103	137	144	179	234	174	0.73	*	18	76.8	6.3	+
Stratum 28	GR	13.9	86	110	127	135	115	100	115	93#	127	156	174		-0.33	+		1.3	0.2		
wt = 1.00	CB	3.8	95	170	156	138	126	100	128#	215	234	315	140		0.25	#		102.9	3.5	#	
a = 52841	ST	35.7	97	94	88	105	109	100	88	93	96	108	78		0.77			47.6	16.6	+	

RW
GR
CB
ST

State/ Stratum	Sp rte	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)					
			1966	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a
Ohio all strata	RW	45 250.9	80	81+108	103	106	100	101	94	82	77	71	362	-4.28	#	40	-15.2	-38.1	#	
	GR	106.2	64	72+	83	90	96	100+116	124	112	117	127		5.46	*		48.8	41.3	*	
	CB	10.0	118	111	92	85	84	100	91	98	85	62		-0.43	*		-33.9	-4.0	*	
	ST	146.8	92	86	99	96	107	100+138	109	117	112	127		1.68			6.3	9.3		
Stratum 15 wt = 0.06 a = 6716	RW	3 431.6	59	63 119+	74	103	100	92	58	61	64	29				3	-24.2	-104.4		
	GR	224.2	102	85 147	80+136	100	220	104	97	125	108					-0.9	-1.9			
	CB	18.4	82	51+	72	81	62	100	63	75	47	72				-11.7	-2.1			
	ST	278.2	103	151+192	134	126	100	179	113	106	110	171				-13.4	-41.2			
Stratum 16 wt = 0.13 a = 13569	RW	6 200.2	74	97	91	95	91	100	120	110	102	113	49	2.52		6	6.8	12.6		
	GR	125.1	73	71	73	104	102	100	116	321	195	198	239		12.06	*		104.9	79.9	#
	CB	5.0	208	150	120	45	58	100	58	78	55	84	91		0.07		-23.0	-1.4		
	ST	178.4	112	94	131	122	139	100	165+238	275	247	360		5.30			15.2	28.2		
Stratum 22 wt = 0.30 a = 32212	RW	14 139.9	71	70	89	120	129+100	107	95	112	115	96	114	-1.49		12	-5.8	-8.9		
	GR	62.2	58	62	63	79	86	100	93	123	111	102	94		4.38	*		85.0	35.2	#
	CB	13.2	82	96+	68	65	99	100	85	99	81	75	60		-0.55		-34.7	-5.0	#	
	ST	85.0	46	71	76	97	96	100	91	111	120	82	86		1.20		9.7	7.9		
Stratum 24 wt = 0.14 a = 14701	RW	7 272.8	64	100	140	107	99	100	84	73+	88	60	51				7	-25.7	-75.1	
	GR	91.1	46	78+106	99	105	100	102	97	113	109	111					57.5	38.8		
	CB	13.4	158	105	129+	40	86	100	89#	65	98	66	35				-40.5	-7.7		
	ST	130.9	60	66	100	90	100	100	104	91	97	101	76		5.18		47.5	48.8		
Stratum 31 wt = 0.37 a = 38928	RW	15 320.4	101	82	106	104	100	104	98	73	68	67	110	-6.28	+	12	-17.8	-54.4	+	
	GR	121.3	60	71	74	91	87	100	105	88	96	106	125		4.98	*		38.0	41.0	+
	CB	6.4	238	262+154	#294*	71	100+182	203	151	113	110				-0.33		-38.0	-3.0	#	
	ST	170.2	112	80	82	83	103	100	156	85	91	99	106		0.01		-1.4	-2.5		

Paired route
comparison (1974-76
minus 1966-68)

Paired route
comparison (1974-76
minus 1966-68)

		Annual population index												Linear trend 1966-76			
State/ Stratum	Sp	Mean birds/ route	Num rts	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a
Ontario all strata	RW	71	28.9	-	110	90	83+	95	100	134	110	111+130	138	348	1.46	*	
	GR	19.8	-	120	84	115+	79+100	99	119	72+	95	90	-	-0.62	+		
	CB	7.7	-	164+	81#112	84	100	104	74+101	99#124	-	-0.23	+				
	ST	43.3	-	175	88	101	105	100	100	95	99	103	109	-1.59	*		
Stratum 16 wt = 0.04 a = 25201	RW	8	146.3	-	-	61	68	85#100	90	99	59+	76	88	47	4.76		
	GR	192.6	-	-	94	138	78	100	78	127	54	57	61	-	-7.90		
	CB	21.6	-	-	90	122	183+100	113	76	103+	75	97	-	-0.35			
	ST	260.2	-	-	97	77	85	100	103	94	77	85	75	-	-5.04		
Stratum 18 wt = 0.09 a = 53395	RW	19	158.0	-	81	66*	87+105	100	177	120+142	184	200	-	124	15.72	*	
	GR	70.7	-	93	65	108	90	100	122	101	95	120	95	-	-0.58		
	CB	28.7	-	165+	81	102	97	100	109	102	131	155	143	-	1.06		
	ST	163.0	-	176	88	92	93	100	95	91	125	136	149	-	2.07		
Stratum 28 wt = 0.27 a = 158935	RW	24	20.6	-	-	155	101	84	100	105	131	156	146	-	-0.11		
	GR	8.2	-	-	133	126	103	100	80	103	84	88	82	-	-0.14		
	CB	9.7	-	-	104	179	82	100	133	96	117	111	151	-	0.33		
	ST	37.1	-	-	103	126	117	100+158	147#	94	106	137	-	-0.06			
Stratum 29 wt = 0.60 a = 360538	RW	20	5.3	-	-	89	80+104	100#152	98	106	107	99	-	59	-0.18		
	GR	5.4	-	-	56	72	56	100	121	119	75	164	164	-	-0.34		
	CB	2.7	-	-	55	55	37	100	70	22	65	46	106	-	0.11		
	ST	13.2	-	-	62	113	123	100	73	72	101	83	68	-	-2.56		

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index								Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a
Oregon all strata	RW	49	36.0	-	-	147*136*	75#100	102	116	117	105	108	203	5.20	*	13	-29.1	-4.1	+		
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0.00	0.00	*	0.0	0.0	0	0		
	CB	7.2	-	-	54	80	93	100	63	45	60	61	82	0.45	+	0.0	0.0	0	0		
	ST	27.1	-	-	41	36	89	100	103	102	102	120	113	1.67	#	67.8	11.8				
Stratum 64 wt = 0.15 a = 37418	RW	7	42.5	-	-	286	73	49	100	121	307	251	117	119	27	3.20	2	-85.7	-22.7		
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	*	0.0	0.0	0	0	
	CB	7.0	-	-	0	7	0	100	550	237#	86+134	188	0.96	0.41	+	0.0	7.5				
	ST	27.6	-	-	28	67	43	100	91	200	84	155	175	4.24	*	75.3	12.8				
Stratum 67 wt = 0.11 a = 28055	RW	7	4.4	-	-	0	100	100	100	56	115	68	52	49	27	0.07	2	0.0	0	0	
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	*	0.0	0.0	0	0	
	CB	4.7	-	-	100	100	100	100	21	10#	47	34	17	0.41	+	0.0	0.0	0	0	0	
	ST	8.2	-	-	100	100	100	100	35	157	87	118	71	1.32	+						
Stratum 68 wt = 0.10 a = 25185	RW	7	36.2	-	-	58	32	78	100	64	130	112	197	225	31	7.65	*	2	29.6	4.0	
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	*	0.0	0.0	0	0	
	CB	14.5	-	-	13+	23+	14	100	39	20	36	73	99	2.71	+	108.3	6.5				
	ST	38.5	-	-	31	56	87	100	112	80	104	72	83	6.14	+	725.6	65.3				
Stratum 89 wt = 0.41 a = 102108	RW	13	56.7	-	-	222	267	100	100	122	101	114	112	107	48	8.93	2	-11.0	-2.2		
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	*	0.0	0.0	0	0	
	CB	3.8	-	-	300	300	900	100	156	107	276	110	214	0.78	#	-13.3	-0.2				
	ST	26.2	-	-	18	18	40+100	112	60	65	84	91	0.15		-15.6	-1.8					
Stratum 93 wt = 0.23 a = 56351	RW	15	10.1	-	-	120	100	100	100	57	58+	53	39	46	70	1.24	*	5	-41.7	-1.0	
	GR	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	0.00	*	0.0	0.0	0	0	
	CB	11.4	-	-	109	172	152	100	84	104	94	104	115	-1.48	*	-45.4	-7.8	#			
	ST	32.7	-	-	152	65	287	100	97	156	218	267	173	0.89		43.7	17.9				

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Linear trend 1966-76				
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg
Penn. all strata	RW	94	95.4	88	111	109	103	101	100	99	98	101	89	90	563	-1.54	*	44	-7.2	-7.1
	GR	99.0	102	90	91	94	87	100	101	91	97	93	81		-1.93	#		-10.5	-11.0	
	CB	9.6	100	102+	73#	116	99	100	98#	75	68	54	70		-0.30	#		-16.8	-2.0	
	ST	97.2	110	105	92#	111	103	100	98+110	127+	97	97		-1.10				-10.4	-11.2	
Stratum 10 wt = 0.13 a = 15095	RW	16	93.9	82	73	85	98	84	100	88	96	91	92	95	105	2.91	#	9	30.7	17.0
	GR	257.4	100+	63	106	92	83	100*	81	89	93	85	83		-14.41	*		-33.7	-110.3	
	CB	5.9	192	200	160	248	133#	100+156+	81	71	84	107		-0.48			-55.7	-5.9		
	ST	211.8	186	140	106#	138	120	100	92+102	105	126	134		1.65			-2.4	-5.2		
Stratum 13 wt = 0.25 a = 29358	RW	21	89.6	85	145+124	91+119	100	106	92	99	103	101		136	-1.73	#	13	0.8	0.6	
	GR	144.6	108	105#	77	89	92	100	132	92	92	88	79		-2.82			-14.0	-18.5	
	CB	10.7	105	102	92	104	78	100	117	80	74	69	71		-0.33	+		-27.8	-3.2	
	ST	99.0	143	127+	88	80	86	100	94	108	173#	87	98		-0.05			-2.3	-2.4	
Stratum 22 wt = 0.11 a = 12877	RW	12	102.2	133	78	94	96	100	100	88	87	100	85	72	63	-6.33	*	4	-9.7	-10.3
	GR	51.6	48	58	50	63	65	100	114	148	140	153	140		3.27	*		93.4	29.1	
	CB	10.2	56	53	23	47	87	100	72	35	41	24	19		-0.48			13.8	1.3	
	ST	95.4	107	80	89	149+	94	100	115	131	134	113	117		-4.55	#		8.3	7.4	
Stratum 24 wt = 0.51 a = 59132	RW	45	97.1	76+115	113	108	97	100	100	101	104	83	88		259	-1.53		18	-7.2	-16.3
	GR	46.0	86	102	98	114	94	100	84	87	106	104*	76		0.57			18.7	9.4	
	CB	9.9	108	117	76+138	111	100	96	88	77	59	89		-0.21			-9.2	-1.2		
	ST	67.2	75	91	91	105	109	100	102	113	111	82	69		-1.58	+		-24.8	-21.2	

RW
GR
CB
ST

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route	Annual population index										Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)			
			66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Pr. Ed. Is.	RW	1	25.3	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0	0	
Stratum 28	GR	99.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
wt = 1.00	CB	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
$\alpha = 5662$	ST	86.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	

RW
GR
CB
ST

Paired route
comparison (1974-76
minus 1966-68)

Linear trend
1966-76

Annual population index

State/ Stratum	Sp	Mean birds/ route	Num rtes	Annual population index												Paired route comparison (1974-76 minus 1966-68)				
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg
Quebec all strata	RW	47	21.7	31#	59	70	111	84+100	122	113	124	156	172	162	0.85	*	11	60.0	9.8	
	GR	13.6	78	70	91+	79+	97	100	92	88	71	56	65	-0.21	-0.21	-2.8	-0.3			
	CB	7.5	34	51	55	57	62#100+	61#	41	47	53	69	-0.50	*#	6.2	0.3				
	ST	46.3	82	59	84	118	102	100	114	116	107	133#180	-3.50		-14.2	-28.6				
Stratum 18 wt = 0.05 a = 31515	RW	9	200.9	38#	72	74+109	82	100	136	123	113	168	158	55	18.24	*	6	80.1	128.1	
	GR	60.6	107	96	86	74	82#100	83	76	61	72	86	-2.63	#	-32.5	-24.1				
	CB	28.4	31	46	76	50	80	100	87	66	73	76	93	0.78		21.6	5.0			
	ST	160.0	163	117	108	119	138#100	107	122	104#	71	121	-4.35		-14.2	-28.6				
Stratum 28 wt = 0.17 a = 109314	RW	25	35.7	-	45	63	113	94	100	107	95	131	143	166	84	0.84	4	53.9	23.7	
	GR	32.1	-	62	101+	87	102	100	104	86	83	73+	49	0.01		7.6	3.0			
	CB	14.7	-	76	64	77	72	100	92+	65	64	76	93	-0.34		-20.3	-4.2			
	ST	87.7	-	62	113	164	126	100	122	112	116+193	169	-3.25	+	-14.4	-24.2				
Stratum 29 wt = 0.78 a = 485736	RW	13	7.0	-	-	29	14	77	100	109	109	122	109	208	23	-0.27	1	-1.0		
	GR	6.5	-	-	-	0	0	103	100	86	129	80	16	40	-0.11		0.5			
	CB	4.5	-	-	-	31	31	31+100	10	0	11	11	18	-0.62		1.0				
	ST	29.8	-	-	-	88	88	88	100	0	2	0	2	3	-3.50	+	0			
		RW																		
		GR																		
		CB																		
		ST																		

RW GR CB ST

Paired route
comparison (1974-76
minus 1966-68)

		Annual population index										Linear trend 1966-76									
State/ Stratum	Sp	Num rtes	Mean birds/ route	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Rhode Is.	RW	4	63.5	57	57	41	115	56	100	81	104	69	74	106	22	3.02	+	2	9.6	3.9	
Stratum 12	GR	43.6	230	53	44	97	157	100	93	67	50	46	52		1.71			47.0	16.3		
wt = 1.00	CB	2.7	225	338	150	75	700	100	50	75	64+	21	54		-0.51	*		-59.5	-2.5		
$\alpha = 2717$	ST	159.2	63	63	72	63	82	100	118#	89	61	48	63		15.04	*		266.6	121.3		

RW
GR
CB
ST

RW
GR
CB
ST

RW
GR
CB
ST

RW
GR
CB
ST

Paired route
comparison (1974-76
minus 1966-68)

Stratum 37	RW	8	161.7	-	-	-	-	97	100	141	164	150	147	179	22	3.08	0	0
wt = 0.18	GR	13.2	-	-	-	-	-	100	100	75	100	44	152	257		0.83	0	0
a = 71088	CB	36.0	-	-	-	-	-	200	100	208	203+344	285	289			3.24	*	0
	ST	10.9	-	-	-	-	-	100	100	64	20	38	56	80		2.31	+	0
																		39.3
Stratum 38	RW	7	82.9	-	-	-	-	94	100	125	155	139	184	182	24	11.45	*	1
wt = 0.20	GR	4.0	-	-	-	-	-	0	100	0	0	0	0	0		1.55	*	0
a = 77485	CB	26.2	-	-	-	-	-	293#100	126	82#124	121	124				4.77	*	17.3
	ST	16.4	-	-	-	-	-	58	100	42	60	60	35	30				15.3

RW GR CB ST

Paired route
comparison (1974-76
minus 1966-68)

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route										Annual population index						Linear trend 1966-76	
		Num rts	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a			
S. Dakota all strata	RW	34	130.7	-	95	89+	129	109	100	111	127	117+	105	84	211	-0.64			
	GR	59.5	-	108	127	123	99	100#	150	110	126	109	126			1.12	*		
	CB	36.0	-	92+	74#	113	112	100	103*	148	135	123#	167			1.47	#		
	ST	7.5	-	30	58	57	60	100	168	142	115	147	100			0.82	#		
Stratum 37 wt = 0.35 a = 69448	RW	15	157.7	-	113#	83	127	99	100	103#	153	138#	117	101	81	-3.17			
	GR	128.1	-	124	130	124	104	100+	150	112	128	108	123			-0.60			
	CB	53.7	-	108*	66+115	124	100	93#	144	144	122	132			0.22				
	ST	13.0	-	37	57	64	66	100	64	158	156	198	126			1.85	*		
Stratum 38 wt = 0.12 a = 21298	RW	4	173.0	-	68	66	127	91	100	88	95	133	104+	64	26	-1.85			
	GR	57.7	-	45#	130	104	81	100	256	119	112	109	172			7.86	*		
	CB	35.0	-	68	124	90	88	100	107	154	102	94	246			5.17	*		
	ST	2.6	-	0	0	0	0	100	26	72	15	0	0			0.19			
Stratum 39 wt = 0.50 a = 99130	RW	13	110.4	-	93	107	132	131	100#	125	118	100	98	80	88	1.32			
	GR	16.0	-	66	90	120#	74	100	92	112	160	145	125			0.95	#		
	CB	26.3	-	70	80	122	101	100	115+	153	132	132	176			1.67	*		
	ST	5.2	-	31	115	86	90	100	442	120	98	149	156			0.29			
Stratum 61 wt = 0.04 a = 6851	RW	2	20.9	-	-	-	-	-	-	-	-	-	-	16	0.35				
	GR	0.7	-	-	-	-	-	-	-	-	-	-	-		0.28				
	CB	0.2	-	-	-	-	-	-	-	-	-	-	-		-0.03				
	ST	0.7	-	-	-	-	-	-	-	-	-	-	-		0.21				

Paired route
 comparison (1974-76
 minus 1966-68)

State/ Stratum	Sp	Num rds	Mean birds/ route	Annual population index										Linear trend 1966-76							
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Tenn. all strata	RW	43	28.5	76	81+95	89	89	100	110+129	120	132	117	397	1.40	*	42	45.8	10.5	*		
	GR	93.0	79	84#104+	90	85+100	106+130	108#85#	73	0.51	0.51	0.5	0.4	0.5	0.5	0.5	5.5	5.5	0.5		
	CB	9.5	116	120	98	96	88	100	111	108	103	106	102	0.12	0.12	0.12	7.8	7.8	0.5		
	ST	54.9	74	74	74	76	77+100	100	100	88	85	85	85	0.51	0.51	0.51	3.7	3.7	0.5		
Stratum 4 wt = 0.23 a = 24152	RW	10	36.1	62+	87	92	76#104	100	91	121	112	130	99	95	1.59	*	10	39.9	11.9	*	
	GR	90.3	74	98+141	108	87	100	103#136	140	124#79	79	1.50	1.50	1.50	1.50	1.50	50.0	7.9	50.0	3.6	
	CB	8.8	49	48	55	55	66	100	79	88	111	84	89	0.58	*	-4.3	-4.3	-4.3	-4.3	-4.3	
	ST	23.9	138	145	145	144	204#100	133#74	183	65#114	65#114	65#114	65#114	-0.68	-0.68	-0.68	-0.68	-0.68	-0.68	-0.68	
Stratum 5 wt = 0.02 a = 1955	RW	2	160.9	-	-	-	-	-	-	-	-	-	18	2.56	2	1.2	2.3	32.3	46.3	#	
	GR	171.2	-	-	-	-	-	-	-	-	-	-	2.70	2.70	2.70	2.70	2.70	21.4	21.4	2.2	
	CB	13.4	-	-	-	-	-	-	-	-	-	-	-0.22	-0.22	-0.22	-0.22	-0.22	26.4	26.4	14.2	
	ST	74.5	-	-	-	-	-	-	-	-	-	-	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	
Stratum 13 wt = 0.18 a = 19109	RW	8	23.2	78	103	115	115	97	100	110	103	124	116	106	76	0.53	+	8	22.6	4.7	#
	GR	117.6	93	85	74	74	66#100	79	71+	47	44	40	40	-7.27	-7.27	-7.27	-7.27	-7.27	-42.3	-42.3	-55.2
	CB	7.1	113	139+	86	90	56+100	103	81	73	100	77	77	-0.21	-0.21	-0.21	-0.21	-0.21	-23.5	-23.5	-2.0
	ST	118.1	91	91	92	75	80	100	131	96	115	121	115	-0.28	-0.28	-0.28	-0.28	-0.28	-3.7	-3.7	-4.8
Stratum 14 wt = 0.39 a = 41992	RW	16	25.4	65	65	88	88	82+100	119	143	128	135	130	143	1.80	*	15	78.5	13.5	*	
	GR	106.7	51#76	96	87	92	100	117	165	112	93	84	84	3.05	3.05	#	15.3	15.3	12.5	12.5	
	CB	12.2	149	181	133	112	115	100+142	123	99	132	127	127	0.02	0.02	0.02	-6.4	-6.4	-0.8	-0.8	
	ST	54.5	45	49	50	62	49#100	72	86	57	54	51	51	1.28	1.28	1.28	1.28	1.28	23.7	23.7	8.0
Stratum 21 wt = 0.12 a = 13038	RW	4	19.9	68	31	55	62	61	100	78	114	90	109	95	37	1.53	*	4	99.2	12.6	#
	GR	45.2	194	68+110	83	131	100	173	197	350	113	137	137	1.86	1.86	1.86	1.86	1.86	59.8	59.8	22.3
	CB	8.5	105#	43	105	126	94	100	106	154	133	85	112	0.30	0.30	0.30	49.2	49.2	3.0	3.0	
	ST	36.8	71	82	68	73	117	100	81	212	73	130	148	2.21	2.21	2.21	2.21	2.21	53.2	53.2	14.1

Stratum/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a						
Stratum 23	RW	3	13.5	71	74	67	78	71	100	104	90	102	78	74	28	0.09		3	16.1								
w _t = 0.06	GR	18.2	176	183	190	172	141	100	141	403	252	190	107			0.01		0.0	0.0	1.9							
a = 6794	CB	2.9	120	54	91	100	82	100	54	82	73	91	27			-0.17		-27.3	-0.9								
	ST	18.6	163	74	219	160	130	100	119	107	114	137	107			-0.97		-21.6	-4.7								

RW
GR
CB
ST

State/ Stratum	Sp	Num rts	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Texas all strata	RW	112	51.4	-	147	145	165	130#100	93#131	139	139	127	626	0.76	*	51	46.3	14.3	#		
	GR	5.4	-	25	32	42+	91	100#201	174	158+274	180	0.66	0.08	254.5	8.4	8.4	5.6	1.6	2.3	*	
	CB	18.8	-	112	83	95	99	100	97	97	109	104	89	0.08	-0.03	82.1	82.1	8.1	2.3		
	ST	3.9	-	53	46	92	96	100	90	85	89	101+	71	-0.03							
Stratum 4 wt = 0.10 a = 69451	RW	12	15.2	-	189	116	84	119	100	74#133	107	96	86	77	0.01	#	7	-11.7	-2.0		
	GR	13.4	-	80	80	88	114	100	201	242	194	407	193	2.18		403.9	20.6	20.6			
	CB	25.1	-	131	116	96	116	100	102	104	96	101	91	0.48	-0.09	22.9	6.2	6.2			
	ST	10.3	-	77	38	58	53	100	68	60+	38+	60	67	-0.09		175.0	8.4	8.4			
Stratum 6 wt = 0.20 a = 138718	RW	29	127.1	-	88	98	110	121	100	96	125	139	134	130	192	-0.55		16	28.6	34.8	
	GR	14.3	-	26	30	45	90	100	156	108	98	117	127	0.76			57.3	4.3			
	CB	21.0	-	83	62	69	92	100	118	98	113+	93	82	0.28		-1.0	-0.2				
	ST	10.5	-	44#	71	110	144+100	122	108	114	156	109	0.76	#		175.0	8.4	8.4			
Stratum 7 wt = 0.13 a = 87858	RW	18	86.5	-	248	172+386	145	100	94	178	194	159	128	102	-0.67		6	213.1	26.0		
	GR	0.4	-	100	100	100	100	100	100	100	100	981	151	0.25	#		-	0.2			
	CB	26.6	-	100	73	82	69#100+	73	104	105	109	77	0.16		0.16	0.8	0.2				
	ST	0.6	-	0	0	50	125	100	25	125	266	443	74	0.18	#	-	0.2				
Stratum 33 wt = 0.19 a = 129987	RW	13	25.8	-	91	91	158	180	100	79	54	51	46	42	66	1.41	+	4	367.5	14.7	#
	GR	4.9	-	12	23	17	54	100	564	471	523	999	533	0.72		1650.0	13.2				
	CB	19.5	-	198	103	181	150	100	96	78	102	104	72	-0.94	+	-8.5	-1.7				
	ST	1.2	-	72	16	200	46	100	60	93	133+	180	93	0.04		242.9	3.4				
Stratum 34 wt = 0.02 a = 11968	RW	2	230.0	-	-	-	-	-	-	-	-	-	-	-	1		0	0	0		
	GR	2.5	-	-	-	-	-	-	-	-	-	-	-	-							
	CB	2.5	-	-	-	-	-	-	-	-	-	-	-	-							
	ST	6.8	-	-	-	-	-	-	-	-	-	-	-	-							

Texas
(continued)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a		
Stratum 35	RW	7	26.9	-	-	183	-	-	100	98	200+174	513	403	19	2.39	*	3	62.6	9.2	#			
wt = 0.12	GR	1.0	-	-	0	0	-	100	100	100	100	100	117	0.20	-	-	-	-	0.2				
a = 78946	CB	1.4	-	-	140	-	-	100	100	69	35	6	1	-0.01	*	-56.5	-1.3	-					
	ST	1.7	-	-	0	-	-	100	0	0	60	0	0	0.29	*	-	-	0.3					
Stratum 53	RW	19	4.0	-	124	124	134	139	100+226	178	244	250	269	104	0.41	*	8	52.6	1.0	#			
wt = 0.15	GR	0.0	-	100	100	100	100	100	100	100	100	0	166	331	0.01	-	-	0.1					
a = 102155	CB	25.6	-	74	82	76+102	100	107	111	124	124	147	147	1.19	*	45.3	11.1	0.1					
	ST	0.3	-	105	105	0	17	100	50	0	169	121	193	0.01		33.3	0.1						
Stratum 81	RW	12	0.1	-	0	200	100	100	100	100	211	211	65	-0.01	7	-100.0	-0.1						
wt = 0.09	GR	0.0	-	0	0	0	0	0	0	0	0	0	0.00		-	-	0						
a = 59845	CB	8.1	-	91	80+104	69	100	36	43	92	92	53	-0.74	#	-18.9	-2.0							
	ST	0.0	-	0	490	100	100	100	100	100	350	700	0	0.00		100.0	0.1						
	RW																						
	GR																						
	CB																						
	ST																						

Paireu route
comparison (1974-76
minus 1966-68)

State/ Stratum		Annual population index												Linear trend 1966-76				Comparison (1974-76 minus 1966-68)			
	Sp	Mean birds/ route	Num rtes	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a
Utah all strata	RW	11	4.7	-	-	60	138	25	100	3#169+268	114	64	39	0.25	5	172.2	3.1	+			
	GR	0.0	0.0	-	-	0	0	-	0	0	0	0	0	0.00	0.0	0.0	0	0	0	0	
	CB	1.2	1.2	-	-	265	219	232	100	41	0	141	161	19	0.13	74.2	2.3				
	ST	11.5	11.5	-	-	193	340	147	100	359	346	999	999	999	0.38	-56.2	-10.0				
Stratum 54 wt = 0.19 a = 141336	RW	1	0.6	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	
	GR	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	
	CB	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	
	ST	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	
Stratum 63 wt = 0.12 a = 25633	RW	2	1.7	-	-	-	-	-	-	-	-	-	-	-	7	1	1.5	0	0	0	
	GR	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0.5	0	
	CB	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	
	ST	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	
Stratum 84 wt = 0.29 a = 62453	RW	4	3.9	-	-	0	100	100	100	0	305	305	51	-	13	0.67	3	714.3	5.0	3.7	
	GR	0.0	0.0	-	-	0	0	0	0	0	0	0	0	-	0.00	0	-	0	0	0	
	CB	0.8	0.8	-	-	100	100	100	0	0	0	0	0	-	0.32	-	-	4.0	-	2.7	
	ST	3.5	3.5	-	-	100	100	100	100	100	100	100	100	-	-1.22	-	-94.6	-12.3	-	-16.3	
Stratum 88 wt = 0.39 a = 83206	RW	4	8.2	-	-	50	138	25	100	3	77+171	109	78	-	16	0.27	1	0	0	0	
	GR	0.0	0.0	-	-	0	0	0	0	0	0	0	0	-	0.00	0	-	0	0	0	
	CB	2.0	2.0	-	-	398	299	349	100	133	0	212	242	30	-	0.05	-	0.5	0.05	0.05	
	ST	26.8	26.8	-	-	193	340	147	100	359	346	999	999	999	-	1.90	-	0	0	0	

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route										df	slope	P ^a	% chg	abs chg	P ^a			
		66	67	68	69	70	71	72	73	74	75									
Vermont all strata	RW	22	80.4	113*155	150*119+108	100	95	98	108#	84	100	158	-0.95	17	-8.3	-7.2				
	GR	19.2	91	84	100	105	14*100	107	125	90	94	126	0.32		8.7	1.7				
	CB	6.3	125	68	55	78	75	100	124#	34+101	107	103	-0.28		0.0	0				
	ST	74.1	202	183	136+	79+	95	100	82	72	90	81	0.34		9.0	6.5				
Stratum 18 wt = 0.16 a = 3745	RW	4	151.5	-	121	147	125	84	100	102	94	99	82	97	22	-3.02	-24.0			
	GR	29.6	-	93	113	52	86	100	80	64	54	68	54	-0.02		-28.5	-11.2	+		
	CB	9.3	-	300	117	150	67	100	250	0	27	112	100	-1.24		-42.3	-3.3			
	ST	101.1	-	228	194	85	126	100	43	44#	71	64	54	-6.49		-34.1	-44.0			
Stratum 27 wt = 0.51 a = 12269	RW	11	74.7	134#188	162	132	126	100	95	101	119#	82	115	80	-0.38	9	1.2	0.9		
	GR	19.1	91	60	92	150	84	100	116	162	106	86	137		0.62		30.6	4.8		
	CB	7.4	79	34	46	83	82	100	106+	17	83	33	24		-0.50	*	-17.5	-1.0		
	ST	77.4	282	249	122	85+108	100	93	74	93	91	72		1.41		36.4	20.5			
Stratum 28 wt = 0.33 a = 7990	RW	7	55.7	101	133	127#	85	101	100	88	96	98	88	78	56	-0.85	5	-16.6	-11.8	
	GR	14.4	87+117	99	75	39+100	123	133	98	123	156				0.02		18.6	3.0		
	CB	3.1	22	76	33	0	54	100	123	145	174	297	379		0.51	*	120.8	2.9		
	ST	56.4	143	134	135*	69	46+100	84	87	91	101	115				1.89		12.1	8.5	

RW GR CB ST

RW GR CB ST

Paired route
comparison (1974-76
minus 1966-68)

Annual population index

State/ Stratum	Sp	Num rds route	Mean birds/ route	Linear trend 1966-76										Paired route comparison (1974-76 minus 1966-68)						
				66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg
Virginia all strata	RW	41	26.3	432	94*	147#	121+141*	100	94#	155*	122*	161*	112	200	-0.57	21	-33.4	-11.9		
	GR	120.2	110	127+	80	179	100	86	85	77	83	79	-16.63	*	-48.3	-84.3				
	CB	7.1	68	105	110	112	111	100	112	76#	120	91	78	-0.49	*	-11.9	-0.8			
	ST	68.2	323	140	131	124	127	100	76	100	85	104*	76	-6.78	*	-48.6	-56.9			
Stratum 3 wt = 0.02 a = 2543	RW	3	25.4	182	226	89	52	85	100	70	104	15	-	6	9	1	-40.7			
	GR	217.7	120	82	92	102	140	100	100	111	67	-	103			-63.3				
	CB	5.8	104	312	52	35	69	100	100	100	416	-	346			15.0				
	ST	81.7	205	154	172	176	199	100	170	40	157	-	66			-16.0				
Stratum 4 wt = 0.19 a = 19961	RW	5	15.1	27	39	32	54	142	100	115	182	134	134	82	0.24	5	26.4	2.9		
	GR	98.1	29	23	45	31	74	100	71	50	43	38	25	6.23		50.2	32.1			
	CB	4.9	82	82	115	172	117	100	89	78	113	89	72	-0.01		20.4	0.9			
	ST	58.1	209	140	112	151	146	100*	132	139	112	86	78	-1.12		16.8	-9.6			
Stratum 10 wt = 0.07 a = 6905	RW	3	63.0	698	233	250	183	291	100	137	174	159	207	134	13	-1.88	2	-34.9	-32.2	
	GR	177.4	104	124	137	97	151	100	107	88	102	76	90	-11.71	#	-47.7	-116.7	#		
	CB	10.5	10	101	114	214	200	100	57	57	214	86	93	-0.73		-50.8	-6.3			
	ST	131.7	143	168	155	210	152	100	127	143	137	178	83	-8.09		-7.0	-12.8			
Stratum 11 wt = 0.37 a = 37858	RW	14	26.8	94	42#	99	86	78	100#	69	137	105*	203*130	68	1.83	*	7	55.6	8.5	+
	GR	66.8	48	120	121	72	112	100	82	96	111	181	200	3.91		35.2	19.3			
	CB	7.3	50	92	65	72	96	100	133	62	84	51	41	0.00		0.0	0			
	ST	45.5	915	134	104	92	139	100	31	72	56#	112	87	1.66		4.2	1.6			
Stratum 13 wt = 0.27 a = 27552	RW	13	28.8	698	81	221	163	111	100	94	162#	124	128	120	63	-4.25	6	-60.7	-46.7	
	GR	189.3	308	220	218	127	356	100	92	115	80	80	62	-50.76	*	-73.1	-330.2			
	CB	7.4	115	100	192	115	100	100	104	109	141	227	208	-0.33		-42.2	-3.5			
	ST	100.8	339	131	144	105	109	100	71	106	80	76	57	-21.60*		-71.2	-203.7			

Paired route
comparison (1974-75
minus 1966-68)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Linear trend 1966-76					Paired route comparison (1974-75 minus 1966-68)					
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	% abs chg	P ^a					
Stratum 21	RW	2	5.6	-	-	-	-	-	-	-	-	-	-	-	9			0	0	0						
wt = 0.04	GR		5.9	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
$\alpha = 3608$	CB		5.1	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
	ST		13.4	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
Stratum 23	RW	1	17.0	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
wt = 0.04	GR		191.5	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
$\alpha = 4602$	CB		9.5	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
	ST		44.0	-	-	-	-	-	-	-	-	-	-	-				0	0	0						
RW																										
GR																										
CB																										
ST																										
RW																										
GR																										
CB																										
ST																										

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route	Annual population index										Linear trend 1966-76				comparison (1974-76 minus 1966-68)			
			Num rtes	66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg
Washington all strata	RW	28	13.3	-	-	31	114	109	100	83	50	53	38	51	108	0.33	10	288.5	7.5	+
	GR	0.0	0.0	-	-	0	0	0	0	0	0	0	0	0	0.00	-	0	0	0	0
	CB	11.9	-	-	63+	97	115	100	88#146	148	104	108	0.72	*	127.0	8.0	*	14.3	*	
	ST	33.9	-	-	68	87+136	100	167	180#95	162	147	0.37	0.72	*	91.1	14.3	*	14.3	*	
Stratum 64 wt = 0.12 a = 20598	RW	1	0.0	-	-	-	-	-	-	-	-	-	-	5	-	1	0	0	0	0
	GR	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.0	27.0	27.0	27.0
	CB	19.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ST	10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stratum 67 wt = 0.27 a = 46967	RW	10	1.8	-	-	50+100	67	100	133	84	84	84	632	35	0.00	3	85.7	0.6	0.6	
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0	0.00	-	0	0	0	0
	CB	12.0	-	-	45*	96	88	100	84	128	107	85	73	0.02	-	110.6	5.2	#	5.2	
	ST	17.0	-	-	84	87	181	100	73	80	136	66	50	0.17	-	7.8	0.6	0.6	0.6	
Stratum 89 wt = 0.36 a = 62209	RW	7	29.5	-	-	25	131	131	100	82	31	34	22	30	29	0.58	3	483.8	17.9	0
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0	0.00	-	0	0	0	0
	CB	4.4	-	-	35	69	126	100	61	155	88	82	101	-0.04	-	218.5	5.9	+	5.9	
	ST	40.8	-	-	63	82	122	100	252	257	89	234	210	0.40	-	118.1	28.0	+	28.0	
Stratum 93 wt = 0.25 a = 42642	RW	10	8.8	-	-	41	81	68	100	70	119	115	104	107	39	0.48	3	83.7	3.6	+
	GR	0.0	-	-	-	0	0	0	0	0	0	0	0	0	0.00	-	0	0	0	0
	CB	19.1	-	-	161	191	177	100	161	184	253	134	144	1.24	#	43.4	4.9	+	4.9	
	ST	54.0	-	-	48	83	92	100	133	164+	73	153	152	2.58	-	198.4	24.4	+	24.4	

Paired route
comparison (1974-76
minus 1966-68) —

State/ Stratum	Sp	Mean birds/ route	Num rnts	df	slope	p ^a	n	% chg	abs chg	p ^a										
W. Va. all strata	RW	33	50.5	48	66	71	78	79	100	96	86	84	94	122	164	-0.10	17	28.4	15.1	
	GR		55.9	44	38	72#	83	83	100	82	69	55#	76	73		-3.07	#	20.2	12.8	
	CB		12.9	44+	74	66	83	70	100	89	88	61	57	48		-0.46	+	-15.8	-1.9	
	ST		72.3	46	67	83	64	90	100	111	84	110	100	127		1.29		47.9	32.4	
Stratum 13 wt = 0.18 a = 11424	RW	6	67.7	26	64	46	67	61	100	96	68	83	76	81	42	1.08	#	5	51.2	28.5
	GR		155.3	60	56	94	109	116	100	79	41	60+	78	60		-15.00		-8.6	-14.5	
	CB		22.2	38	53	45	84	56	100	86	74	69	36	29		-1.65		-3.7	-0.7	
	ST		110.8	35	48	112	57	85	100	78	62	63	79	82		-3.63		17.7	20.3	
Stratum 21 wt = 0.18 a = 11186	RW	3	5.2	54	42	21	79	92	100	75	75	83	75	25	19	0.30	2	57.4	2.7	
	GR		4.5	157	257	371	300#	57	100	157	114	257	157	186		-0.12		-23.9	-2.2	
	CB		12.6	38	75	75	71	167	100	75+133	83	108	79		0.29		44.0	3.3		
	ST		38.9	65	101	45	107	96	100	91	100	99	84	81		1.29		25.1	9.8	
Stratum 22 wt = 0.50 a = 30982	RW	16	64.4	58	70	93	86	78	100	88	90	83	96	145	72	-0.26	7	24.0	17.1	
	GR		48.7	32	23	59	65	62	100	80	92	51+	77	85		-0.76		52.1	29.9	
	CB		11.2	48	88	107	77	51	100	86	93	47	58	48		-0.26		-39.7	-4.8	
	ST		79.7	55	83	50	62+	96	100	132	97	163	128	186		3.33		67.4	49.0	
Stratum 24 wt = 0.14 a = 8749	RW	8	37.3	49	49	47	66	128	100	138	117+	83+130	98		31	-1.61	+	3	13.0	6.3
	GR		17.8	2	25	2	32	44	100	194	103	104	111	140		0.55		44.7	7.2	
	CB		6.9	99	214	74	99	126+100	152	70	79	65+102				-0.58	*	1.3	0.1	
	ST		38.7	25	53	43	76	70	100	183	86	66	84	85				70.8	18.2	

Paired route
comparison (1974-76)

State/ Stratum		Annual population index												Linear trend 1966-76							
Mean births/ route	Num rtes	66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	% abs chg	P ^a		
Wisconsin all strata	RW	70	159.4	71	73	81	81	85+100	95+106	108#101	115	544	6.98	*	64	38.2	49.8	*			
	GR	49.4	67+	79	93+	68#	84+100	100	135	111	108	123	2.60	*		32.7	13.7	#			
	CB	20.9	95	84+100	99	92	100#120	122+103	120	101	0.21		-9.4	-2.0							
	ST	68.4	56#	85*134	170	109	100+	78	92	105	100	114	2.03	#		25.5	15.3	+			
Stratum 16 wt = 0.20 a = 27889	RW	13	318.6	59	52	66	70	70	100	92	103	103*	82+119	104	17.92	*	13	65.3	136.7	#	
	GR	103.4	57#	73	91	61	70#100	101	173	128	104	110	5.70	#		45.3	34.6	#			
	CB	17.9	104	88	128	123+	93	100	99	118	295	125	0.82			42.9	7.2				
	ST	143.2	56#	96	130	121	124	100	96	81#145	128	122	7.43	*		66.4	69.4	#			
Stratum 17 wt = 0.26 a = 36180	RW	18	196.7	64#	88	92	87#102	100	96	104	116	121	111	143	9.21	*	17	23.9	43.0		
	GR	64.5	100	86	126	80	101	100	88	88	86+106	134	0.20			-16.3	-13.1				
	CB	24.5	118	108	131	110	103	100+150	118	94	82	73	-1.30	*		-38.4	-11.9	*			
	ST	69.3	59	84+164	291	125	100+	51	43	59	69	62	-2.54			-22.0	-16.2				
Stratum 20 wt = 0.32 a = 45107	RW	22	127.5	90	93	96	91	94	100	98	108	104	109	172	2.71	+	19	28.6	34.2		
	GR	35.1	24#	69	46	61+	90	100	94	136	115	119	132	4.21	*		189.2	31.4	*		
	CB	23.8	67	55	46	80	80	100+114	118	106	93	107	0.80	*		-9.5	-2.1				
	ST	50.4	57	95	145	135#	85	100+	76	132	103	87	176	2.87	#		19.4	9.8			
Stratum 28 wt = 0.23 a = 31883	RW	17	22.9	201	102	104	106	92	100	112	140	111	132	140	125	0.91	*	15	16.0	3.4	
	GR	5.1	222	101	101	81	54+100	321	98	98	90	114	0.32				21.1	0.8			
	CB	15.5	99	94+137	99	101	100	105+158#	97	103	102	102	0.56				7.4	1.0			
	ST	27.6	89	47+	91	181+	70	100	87	217	105	117	124	1.30				57.9	11.4		

State/ Stratum	Sp	Num rfts	Mean birds/ route	Annual population index												Paired route comparison (1974-76 minus 1966-68)				
				Linear trend 1966-76												% chg	abs chg	P a		
Wyoming all strata	RW	21	30.7	-	-	78	80	90	#100	104	48	40	60	37	74	0.03	7	29.0	1.1	
	GR	7.2	-	-	-	235	*104	278	100	319	213	396	351	+999		0.26	42.5	1.7		
	CB	1.4	-	-	-	18	12	0	100	124	88#	14	31	37		0.21	*	20.0	0.1	
	ST	8.3	-	-	-	116	247	95	100	215	282	551	156	591		0.26		122.2	2.2	
Stratum 36 wt = 0.06 a = 14315	RW	1	134.8	-	-	-	-	-	-	-	-	-	-	-		0	0	0	0	
	GR	46.2	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	CB	0.0	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	ST	0.8	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
Stratum 39 wt = 0.23 a = 57881	RW	7	24.3	-	-	146	161	174	100	100	42	64	98	47	36	2.06	*	5	30.2	3.5
	GR	1.6	-	-	-	136	0	333	100	300	67	150	104	196		0.13		27.8	0.5	
	CB	1.3	-	-	-	133	57	0	100	76	126+	25	126	42		0.03		-70.0	-1.4	
	ST	8.8	-	-	-	7	119	56	100	157	87	114	20	44		0.69		190.0	11.4	
Stratum 61 wt = 0.02 a = 4149	RW	1	4.0	-	-	-	-	-	-	-	-	-	-	-		0	0	0	0	
	GR	1.5	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	CB	1.5	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	ST	0.0	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
Stratum 62 wt = 0.05 a = 11722	RW	1	11.5	-	-	-	-	-	-	-	-	-	-	-		0	0	0	0	
	GR	1.0	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	CB	0.5	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	ST	0.0	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
Stratum 64 wt = 0.18 a = 44191	RW	2	1.3	-	-	-	-	-	-	-	-	-	-	-		1	0	0	0	
	GR	0.0	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	CB	4.3	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	
	ST	0.5	-	-	-	-	-	-	-	-	-	-	-	-			0	0	0	

Wyoming
(continued)

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Mean birds/ route	Annual population index												Linear trend 1966-76						Paired route comparison (1974-76 minus 1966-68)			
			66	67	68	69	70	71	72	73	74	75	76	df	slope	p ^a	n	% chg	abs chg	p ^a				
Stratum 84	RW	1	47.8	-	-	-	-	-	-	-	-	-	-	2		0	0	0	0	0.7				
wt = 0.01	GR	16.2	-	-	-	-	-	-	-	-	-	-	-								3.3			
a = 2282	CB	0.0	-	-	-	-	-	-	-	-	-	-	-							0.8				
	ST	0.0	-	-	-	-	-	-	-	-	-	-	-							-28.6	-1.0			
Stratum 86	RW	8	34.6	-	-	-	-	101	81	100	104	65	37	33	-0.27	2	28.0							
wt = 0.47	GR	8.6	-	-	-	-	419	419	419	100	319	354	620	586	999	-0.31	-							
a = 117216	CB	0.7	-	-	-	-	0	0	0	100	50	0	0	0	0	0.13	-							
	ST	13.2	-	-	-	-	16	11	100	100	219	999	999	999	999	0.28	-28.6	-28.6	-28.6	-28.6	-28.6	-28.6	-28.6	-28.6

RW GR CB ST

RW GR CB ST

RW GR CB ST

Paired route
comparison (1974-76
minus 1966-68)

State/ Stratum	Sp	Num rtes	Mean birds/ route	Annual population index												Linear trend 1966-76				Paired route comparison (1974-76 minus 1966-68)			
				66	67	68	69	70	71	72	73	74	75	76	df	slope	P ^a	n	% chg	abs chg	P ^a		
Yukon	RW	8	0.6	-	-	-	-	-	-	-	-	100	133	100	100	15	-0.10	0	0	0	0		
Stratum 68	GR	0.0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0.00	0	0	0	0		
wt = 1.00	CB	0.3	-	-	-	-	-	-	-	-	-	100	0	0	0	0	-0.09	0	0	0	0		
a = 422517	ST	0.2	-	-	-	-	-	-	-	-	-	100	-	0	0	0	0.23	0	0	0	0		

RW
GR
CB
ST

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
EDITORIAL OFFICE
AYLESWORTH HALL, CSU
FORT COLLINS, COLORADO 80523

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
INT 423



NOTE: Mailing lists are computerized. Please return address label with change of address.